A TREATISE ON

MATERIA MEDICA AND THERAPEUTICS.

R. Ghosh, L. M. S., Cal. Univ.

[illegible]

22101480312

Crawford Coll.

D.G. Crawford

24 December 1903

A TREATISE

ON

MATERIA MEDICA AND THERAPEUTICS

Digitized by the Internet Archive
in 2017 with funding from
Wellcome Library

https://archive.org/details/b28984249

A TREATISE

ON

MATERIA MEDICA AND THERAPEUTICS

INCLUDING

PHARMACY, DISPENSING, PHARMACOLOGY AND ADMINISTRATION OF DRUGS.

BY

RAKHALDAS GHOSH, L. M. S., CAL. UNIV.,

LECTURER ON MATERIA MEDICA, CALCUTTA MEDICAL SCHOOL.

PUBLISHERS
HILTON & Co.,
109, COLLEGE STREET, CALCUTTA.

1903.

All rights reserved.

Price Rs. 4/8 or 7s.

PRINTED BY SANYAL & CO., AT THE BHARAT MIHIR PRESS
25, ROY BAGAN STREET, CALCUTTA

WELLCOME LIBRARY INSTITUTE

WELLCOME INSTITUTE LIBRARY
Coll. welTROmec
Call No. Grant
[illegible]
[illegible]

THIS LITTLE VOLUME

IS

Respectfully Dedicated

TO THE

PRINCIPAL OF THE CALCUTTA MEDICAL COLLEGE,

IN

GRATEFUL REMEMBRANCE

OF THE

EDUCATION RECEIVED THEREIN,

BY AN

OLD ALUMNUS

THE AUTHOR.

PREFACE TO VOLUME I.

Materia medica is not an attractive subject, but it must be learnt. I have therefore endeavoured to minimise the labor of the student by condensing the subject-matter, and treating the same on simple methods

Drugs have been alphabetically arranged in order to maintain harmony with the British Pharmacopœia of 1898, and many useful subjects have been introduced. Particular attention has been paid to the description of the non-official preparations, of pharmacy and of dispensing, with a view to enable the student to overcome the difficulties he encounters in practical pharmacy and dispensing. In compiling this portion, I have consulted most of the standard treatises on these subjects, and have received valuable assistance from Whitla's Elements of Pharmacy, Materia Medica and Therapeutics, Martindale's Extra Pharmacopœia, Squire's Companion to the British Pharmacopœia, Lucas's Practical Pharmacy, and MacEwan's Art of Dispensing and Pharmaceutical Formulas. The classification of drugs according to their pharmacology and therapeutics has been so nicely made by Dr. Hale White, that I could not resist the temptation of adopting his plan with some modification, and for this I express my acknowledgments to him. Besides the authors already alluded to, I am grateful to many others, especially to Drs. T Laudor Brunton, J. Mitchel Bruce, William Murrell and Sydney Ringer.

My original plan was to bring out the book complete in one volume, but the pressure brought to bear on me by the students has compelled me to publish it in two volumes.

I have spared no pains to make the treatise thoroughly reliable, and up-to-date. I thank many of my friends for their valuable advice and encouragement, especially Professor Thomas R. Fraser of Edinburgh ; and Mr. E. W. Harper, M.P.S., Pharmaceutical Chemist, for going over the page-proofs of pharmacy and dispensing.

R. GHOSH.

PREFACE TO VOLUME II.

Owing to the untimely death, in August last, after a prolonged and painful illness, of the late Dr. Rakhaldas Ghosh, he was unable personally to see the second volume of this treatise through the Press. He had, however, practically completed his manuscript notes, and almost his last words were "do not let my work die." I, therefore, undertook the duties of editor, and have now much pleasure in presenting the complete book to the public. Dr. Ghosh has written so full a preface to the first volume that nothing remains for me to say except to express my regret that my friend is no longer amongst us to witness the success which I feel sure his work will attain. In these two small volumes the student will find, in a compressed form not only everything of value that has been written on the subject of Therapeutics, but also many original observations culled from Dr. Ghosh's own practice and embodying the results of his long experience in the treatment of disease in the tropics. I can, therefore, with every confidence strongly recommend them to the notice of all those who propose to practise their profession in the East.

C. P. LUKIS, M. B., F. R. C. S.,
Lt. Colonel, I. M. S.,
Offg. Professor of Therapeutics,
Calcutta Medical College.

CALCUTTA :
December, 1902.

PUBLISHERS' NOTE.

For the convenience of students the whole treatise is now published in one volume.

CONTENTS.

PART I.—MATERIA MEDICA PROPER.

PAGE.

Definitions 1
Drugs 2
Characters of Drugs 3
Composition of Drugs 4
Impurities of Drugs 7
British Pharmacopœia and Pharmaceutical Processes 9
Weights and Measures 13
Pharmacopœial Preparations ... ... 15—61
Non-Official Preparations ... ... 61—73

PART II.—PHARMACY AND DISPENSING.

General Directions ... ... 74—76
Weighing and Measuring ... ... 76—77
Waters ... ... 77—78
Decoctions 78
Infusions... 78
Emulsions and Mixtures ... ... 79—80
Emulsions and Mixtures of Special Drugs ... ... 80—84
Pills ... ... 84—85
Excipients ... ... 86—87
Pills of Special Drugs ... ... 87—90
Pill Coating ... ... 90—92
Powders ... ... 92—93
Blisters ... ... 93—94
Plasters ... ... 94—96
Suppositories, Pessaries and Bougies ... ... 96—97
Suppositories and Bougies of Special Drugs 97
Syrups ... ... 97—98
Tinctures ... ... 98—99
Lozenges... ... ... 99—100
Ointments ... ... 100—101
Ointments of Special Drugs ... ... 101—102
Jellies, Mollins and Pastes 102

PART III.—ADMINISTRATION OF DRUGS.

Channels for Administration of Drugs ... ... 103—105
Dosage or Posology ... ... 105—108
Grouping of Doses ... ... 108—109
Incompatibility and Antagonism ... ... 109—113

PAGE.
Explosive Combination 111
Combination of Drugs ... ... 111—113
Art of Prescribing... 113
Weights and Measures in a Prescription 113
English and Indian Domestic Measures ... ... 113—114
Abbreviations and Contractions ... ... 114—116
Prescription Writing ... ... 116—117
Elegant Prescriptions 117
Directions to the patient 118
Prescriptions for Children ... ... 118—119

PART IV.—PHARMACOLOGY AND THERAPEUTICS.

General Pharmacology of Drugs ... ... 120—122
Classification of Drugs 122
Drugs acting on the Digestive Organs ... ... 122—133
Drugs acting on Respiratory System ... ... 133—137
Drugs influencing the Blood ... ... 137—139
Drugs influencing the Heart ... ... 140—142
Drugs influencing the Blood-vessels... ... ... 142—145
Drugs acting on the Urinary Apparatus ... ... 145—148
Drugs acting on the Cutaneous System ... ... 148—151
Drugs influencing Metabolism ... ... 151—153
Drugs acting on the Body-heat ... ... 153—154
Drugs acting on the Muscular System 154
Drugs acting on the Nervous System ... ... 154—161
Drugs acting on the Eye ... ... 161—163
Drugs acting on the Ear 163
Drugs acting on the Generative System ... ... 163—166
Drugs acting on Micro-organisms ... ... 166—168

PART V.—MATERIA MEDICA AND THERAPEUTICS.

Pharmacology and Therapeutics of all the B. P. Drugs, together with the most important non-official remedies ... ... 169—656

ERRATA.

Page	16,	line	26	for	23 ozs.	read	25 ozs.
,,	19,	,,	9	,,	caraway seed	,,	caraway fruit.
,,	21,	,,	7	,,	5%	,,	·5%.
,,	23,	,,	14	,,	ext. gentian.	,,	ext. glycyrrhiza.
,,	27,	,,	33	,,	⅓ to 1 oz.	,,	½ to 1 oz.
,,	33,	,,	14, 15	,,	6 ozs.	,,	6 drs.
,,	37,	,,	19	,,	creasote	,,	creosote.
,,	88,	,,	14, 16	,,	creasote	,,	creosote.
,,	89,	,,	24	,,	potassiam	,,	potassium.
,,	116,	,,	39	,,	bssis	,,	basis.
,,	123,	,,	19	,,	perephery	,,	periphery.
,,	137,	,,	38	,,	"to dry"	,,	dry.
,,	208,	,,	6	,,	sysncope	,,	syncope.
,,	,,	,,	7	,,	subjccts	,,	subjects.
,,	,,	,,	45	,,	enæsthesia	,,	Anæsthesia.
,,	209,	,,	13	,,	internaliy	,,	internally.
,,	210,	,,	10	,,	typoid	,,	typhoid.
,,	,,	,,	24	,,	liquld	,,	liquid.
,,	212,	,,	33	,,	tenior	,,	tenuior
,,	213,	,,	27	,,	liqeurs	,,	liqueurs.
,,	216,	,,	40	,,	occassionally	,,	occasionally.
,,	219,	,,	9	,,	furfural	,,	furfurol.
,,	223,	,,	8	,,	octohedral	,,	octahedral.
,,	246,	,,	23	,,	chrysarobin	,,	chrysarobinum.
,,	,,	,,	32	,,	chrysarobin	,,	chrysarobini.
,,	252,	,,	15	,,	Armoraciæ	,,	Armoraciæ Radix.
,,	290,	,,	35	,,	Preparata	,,	Præparata.
,,	292,	,,	6	,,	calcium chloridum	,,	calcii chloridum.
,,	376,	,,	33	,,	does	,,	do.
,,	421,	,,	5	,,	gummy	,,	gummi.
,,	454,	,,	2	,,	Sodium Iodidum	,,	Sodii Iodidum.
,,	476,	,,	last	,,	1889	,,	1885.
,,	494,	,,	11	,,	arastol	,,	abrastol.
,,	496,	,,	12	,,	Strychine	,,	Strychnina.
,,	504,	,,	21	,,	Sulphacyanides	,,	Sulphocyanides.
,,	527,	,,	31	,,	Pyromidon	,,	Pyramidon.
,,	589,	,,	22	,,	quilladia	,,	quillaia.
,,	600,	,,	6	,,	vegitarians	,,	vegetarians.
,,	610,	,,	31	,,	digltalis	,,	digitalis.

MATERIA MEDICA.

PART I.

Materia Medica, in its widest sense, means the description of *materials or agents* employed in the treatment of disease. But properly speaking, it includes the following branches :—

1. **Materia Medica Proper** is the science which treats of the natural history, as well as the physical and chemical characters, of drugs. **Pharmacognosy** is the old name of Materia Medica Proper.

2. **Pharmacy** is the science and art of preparing and combining drugs, so as to make them fit for administration. It can be divided again as follows :—

(*a*) **Extemporaneous Pharmacy** is the making up or the compounding of formulæ or prescriptions of practitioners of medicine. **Dispensing** is not a part of Pharmacy, but refers to the mode of putting up, labelling, and despatching. A dispenser is a mere distributor of drugs, and a pharmacist is the manufacturer of the same.

(*b*) **Official Pharmacy** consists in the preparation of drugs and formulæ according to such processes as are recognised by or prescribed in an official Pharmacopœia. The British Pharmacopœia is the official Pharmacopœia of the British Empire.

3. **Pharmacology** is the description of the actions of medicines on the general system, or on the individual parts of the body, in health and disease. **Pharmacodynamics** is but another name for Pharmacology, though strictly speaking, it refers to the actions of drugs in health.

Toxicology or the toxic action of medicines comes under Pharmacology. It treats of the actions of drugs produced by such large doses, as might endanger life.

4 **Therapeutics** is the knowledge of remedial measures employed in the treatment of disease. It may be either **empirical** or **rational.**

(*a*) **Empirical Therapeutics** means the treatment of disease from experience only, and conforms to no pharmacological law yet known. In empirical treatment, we can offer no explanation for the success or otherwise of the use of a *particular* drug for a particular disease. Because a certain drug has been found successful in a certain disease, we therefore prescribe it for the same. As mercury in syphilis.

(*b*) **Rational Therapeutics.**—By rational treatment we mean the mode of treatment suggested by our knowledge of chemistry, physiology, pathology, and pharmacology. Thus, when we prescribe $\frac{1}{100}$ gr. of atropine sulphate to check the night-sweats of a phthisical patient, we can explain (see Belladonna) how the perspiration is controlled. By the use of chloral hydrate tetanic convulsions are checked ; we can also explain how this happens.

Accessory Therapeutics.—By accessory therapeutics we mean the treatment of disease, not by the administration of drugs, but by other means ; such as, a **change of climate**, a **regulation of food, clothing, exercise, baths, massage,** and other measures.

MATERIA MEDICA PROPER.

DRUGS.

A. **Source**.—Drugs are obtained from the following sources :—

1. **Inorganic.**—As sulphur, ozone, mineral acids, ammonia, &c.

2. **Metallic.**—As iron, copper, silver, bismuth, zinc, &c.

3. **Organic.**—(*a*) From the **vegetable kingdom** are obtained aconite, hyoscyamus, opium, &c. (*b*) From the **animal kingdom**, cantharides, musk, codliver oil, glycerin, &c.

4. **Synthetic.**—As chloroform, chloral, ether, amyl nitrite, &c. These are prepared synthetically in a chemical laboratory. Some of these drugs are gradually replacing organic ones ; thus, the synthetic acid salicylic is being used for the vegetable acid salicylic derived from the oils of winter-green.

B. **Habitat.**—By habitat is meant the natural abode or locality of a plant or animal from which a drug is obtained. In other words, the drug is said to be **indigenous** to the said country or locality. Thus, Indian hemp is indigenous to India, aloes to Socotra or Barbadoes, aconite to Britain, quassia to Mexico, ipecacuanha to Brazil, musk to Tibet and Central Asia, &c.

C. **Collection.**—The medicinal activity of a drug depends greatly upon the habitat and the season of the year when it is gathered. Thus, rhubarb is useless until it is six years old, China and Turkey rhubarb are richer than that grown in India. Old cinchona bark is richer in quinine than the new. The wild digitalis is more active than the cultivated variety. Socotrine and Barbadoes aloes are more active than other varieties.

Gathering of plants generally is best done during the dry months, but in the case of certain special plants, particular periods of the year are specifically ordered in the B. P. Roots should be gathered in the cold weather, and those of annuals before flowering; barks of trees in the spring, and those of shrubs during autumn; leaves when mature before they change color; flowers when four-fifths have expanded; fruits and seeds when ripe, except pepper, pimento; &c.

CHARACTERS OF DRUGS.

This part of Materia Medica is the most useful, but the least interesting to a student. To learn characters straight from a book, is a useless waste of time and energy, as the student is sure to forget them. He should therefore **study them practically from specimens**, and describe them in his own words. The following points are worthy of note :—

A. **Physical.**—Taking the B. P. or a text book as his guide, the student should carefully examine each specimen with respect to the following :—

1. **General Appearance.**—Whether it is (*a*) *solid*, (*b*) *liquid*, or (*c*) *a powder*. If it is solid, its *shape*, *length*, *thickness*, *consistence &c.* If a powder, whether *amorphous* or *crystalline*. If crystalline, the nature of the crystals.

2. **Color.**—Whether it is *yellow*, like gamboge; *white*, like quinine; *red*, like mercuric iodide; *black*, like charcoal; *grey*, like grey-powder; *blue*, like copper sulphate; *green*, like oil of cajuput; or *colorless*, like ether; and so on

3 **Weight.**—Whether it is *heavy* as litharge, or *light* as magnesia. Specific gravity of liquid drugs

4. **Odor** is very difficult to define. The B P. has used various comparative terms in describing it. Thus, *fishy*, like codliver oil; *aromatic*, like caraway fruit or cardamum seeds; *fragrant*, like rose; *disagreeable*, like iodoform: *characteristic*, when it cannot be defined or compared, as opium; and so on. The smells of some drugs are so characteristic, that they can be easily recognised by their odors alone; as ammonia, ether, chloroform, acetic acid, hydrocyanic acid, carbolic acid, creasote, asafetida, iodoform, amyl nitrite, opium, musk, conium, valerian, many essential oils, &c.

5. **Taste** also is not easy to define. The article may be *sweet*, like sugar; *acid*, like sulphuric acid dilute or vinegar; *fishy*, like codliver oil; *saline*, like common salt; *bitter*, like chirata or quinine sulph.; *pungent*, like mustard or capsicum; *acrid*, like balsam of Peru; *astringent*, like kino or tannic acid; *nauseous*, like aloes: *metallic*, like corrosive sublimate; and so on. Sometimes more than one term is used to denote taste. Thus, lead acetate

has a sweet astringent taste, and copaiba a persistent acrid somewhat bitter taste.

6. **Solubility.**—The knowledge of the solubility of drugs is essential to every practitioner of medicine, without which no prescription can be elegant and free from incompatibility. A drug may be soluble in cold water, or insoluble in cold but soluble in hot or boiling water. It may not be soluble in water at all, but soluble in alcohol, chloroform, ether, oil or glycerin. No rule can be laid down as to the solubility of drugs, except this simple fact;—that *nearly all alkaline salts, and all normal neutral metallic nitrates, chlorates and acetates are soluble in water* ; *vegetable alkaloids are mostly insoluble.*

Some drugs absorb water when exposed to air and liquify ; these are called **deliquescents** ; as potassium hydroxide, potassium acetate, and calcium chloride. On the other hand, many lose their water of crystallisation, and a white powdery crust forms on their surface ; as, ammonium and sodium carbonates. These are called **efflorescents.**

7. **Effect of heat.**—Many drugs are affected by heat in the following ways :—

a. Spontaneous ignition ; as phosphorus, which, unless kept under water, ignites spontaneously.

b. Volatility ; as iodine, which, when exposed to the sun, evolves violet fumes.

c. Fusibility ; as wax, hard paraffin and sulphur, which fuse or melt when heated (see Fusion p. 11).

B. **Chemical Tests.**—The student must be familiar with the tests for the (1) *salts*, (2) *acids*, and (3) any special test for a *compound*. The chemical reactions of some of the *organic bodies*, such as morphine, strychnine, &c should not be lost sight of.

COMPOSITION OF DRUGS.

Inorganic drugs have a definite composition which is well expressed by their names and chemical formulæ. The composition of organic drugs, on the other hand, is always complex and is obtained after considerable analytical labor They are chiefly composed of acids, bases, salts, albuminous substances, alkaloids, balsams, cellulose, colouring matters, extractive matters, ferments, glucosides, gums, gum-resins, neutral principles, fixed and volatile oils, oleo-resins, starch, sugar, &c. Some of them require a brief explanation.

Alkaloids are the active nitrogenous principles formed for the most part in the tissues of plants or animals, or are synthetically prepared in a few cases. They possess the following properties which we quote, as given by Dr. Hale White.—

"(1) They are the active nitrogenous principles of organic bodies.

(2) They are compound ammonias ; that is to say, one or more atoms of hydrogen in ammonia (NH_3) are replaced by various radicals.

(3) They combine with acids to form crystalline salts without the production of water.

(4) They are alkaline, turning red litmus paper blue.

(5) Very few are liquid, such as pilocarpine, conine, nicotine, sparteine, lobeline. Liquid alkaloids nearly always contain only carbon, hydrogen and nitrogen.

(6) The solid ones are colorless, crystalline, and contain oxygen.

(7) They are sparingly soluble in water, readily so in alcohol.

(8) The solutions are intensely bitter.

(9) Most of them are closely related to pyridine, and some may be synthetically prepared from pyridine bases"

The following are the common pure alkaloids of the B. P. :—

Aconitine
Atropine
Caffieine
Cocaine
Codeine
Hyoscyamine
Morphine
Pilocarpine
Physostigmine
Quinine
Veratrine.

It should be noted that the names of alkaloids in Latin terminate in **ina**, and in English **ine.** As *Atropina* (Latin) *Atropine* (English).

Acids are salts of hydrogen. Organic acids of great varieties are found in plants, combined with inorganic bases such as potassium, calcium, or sometimes in a free state.

Bases are substances which react with acids and form salts. They are of two kinds :— 1. *Elementary*, to which metals belong. 2. *Compound*, such as ammonium and the alkaloids.

Balsams :—These are oleo-resinous or resinous substances containing either benzoic or cinnamic acid or both. *Benzoin*, *balsam of Peru* and *Tolu*, *prepared storax*, are the balsams of the B. P. Copaiba and Canada balsams do not come under this group, though they are named balsams.

Essential oils :—These are obtained by the distillation of the entire plants, flowers, fruits or seeds. Most of them are colorless when pure, and highly aromatic. They are inflammable and lighter than water, and leave no greasy mark on paper, which the fixed oils do. Their composition is complex and varies. They contain *Aldehydes*, *Phenol derivatives*, *Etherial salts* or *Esters Ketones* associated with *Terpenes*, *Stearoptenes*, besides various resinous, fatty and acid bodies.

Fats are solid fixed oils at ordinary temperatures and are obtained by expression and heat ; as adeps, oil of theobroma ; &c.

Fixed oils are the compounds of higher fatty acids which remain fluid at ordinary temperatures. They are extracted from seeds or fruits by expression, without heat if possible, or from animal tissues. They are called fixed oils, because they **decompose when distilled**. They contain oleic, palmitic and stearic acids. As an example :—Olive oil is a combination of oleic acid ($C_{18}H_{34}O_2$) with glyceryl (C_3H_5) and Palmitic Acid ($C_{16}H_{32}O_2$) with glyceryl ; in other words, it is a mixture of two oils having the formulæ $C_3H_5(C_{18}H_{33}O_2)_3$ and $C_3H_5(C_{16}H_{31}O_2)_3$ respectively.

Fixed oils form soap and glycerin when acted upon by caustic alkalies or metallic oxides. The process is known as saponification thus :—

$C_3H_5(C_{18}H_{33}O_2)_3$	$+$ $3NaHO$	$=$ $C_3H_5(OH)_3$	$+$ $3NaC_{18}H_{33}O_2$.
Oleate of Glyceryl (Vegetable oil)	Hydrate of sodium (Caustic Soda)	Hydrate of Glyceryl (Glycerin)	Oleate of sodium (Hard soap)

Gums are complex carbohydrates having a viscid consistence obtained by exudation from the stems, branches, or both, of plants. They are composed of.—

(1) *Arabin*, soluble in water ; as Acacia.
(2) *Bassorin*, partially soluble in water ; as Tragacanth.
(3) *Cerasin* or insoluble gum.

Pectin or vegetable jelly occurs in some medicinal plants and is allied to gum.

Gum-Resins are the exudations from plants, containing various proportions of gums, resins and volatile oils. They form an emulsion when rubbed with water. Ammoniacum, Asafetida, Galbanum, Gamboge, Myrrh and Scammony of the B. P. belong to this group.

Glucosides are neutral compounds found in plants, which, under the action of acids, alkalis and ferments (enzymes), in the presence of water, decompose into glucose, and another body (such as alcohol, aldehydes, phenols &c.) different in each instance ; as Salicine, Saponin, Jalapin, Digitalin, Digitoxin, Senegin, Strophanthin, Glycyrrhizin.

Neutral Principles are indifferent crystalline proximate principles, whose chemical composition is not known. They resemble alkaloids in action. Many of them have a bitter taste, as Quassin, and are called "*amroids or bitter principles.*" As Aloin, Elaterin, Santonin, Picrotoxin, Quassin, &c.

Oleo-resins are solutions of resins in volatile oils as found in nature ; as Copaiba, Canada Turpentine, Frankincense.

Resins are solid, brittle, non-volatile, complex substances derived from the oxidation of volatile oils. They are soluble in alkalis forming resin soaps, and in alcohol, but insoluble in water. The resins of the B. P. are Resin, Guaiacum, Jalap, Scammony, Podophyllin, and Burgandy Pitch.

Salts are compounds of acids and bases.

Stearoptenes are solid volatile oils ; as, Camphor, Menthol, Thymol.

Waxes are compounds of fatty acids and monohydric alcohols.

IMPURITIES OF DRUGS.

The impurities in a drug are due to various causes. The following are the common sources :—

1. **Imperfect Selection** :—This happens from the ignorance of collectors of crude vegetable drugs, who are but imperfectly acquainted with their botanical characters, and therefore fail to distinguish them from allied species. Hence is the **substitution** of an inferior or allied article for a genuine one. Many B. P. preparations, as ordinarily sold, do not produce desired results, because they are prepared from inferior ingredients. This is often the case with cascara extract.

2. **Imperfect Preservation** is one of the causes of **deterioration** of many drugs. Several drugs are materially affected by light and air. Time also affects many. Deliquescent salts and scale iron preparations are soon physically changed, unless they are kept in well sealed bottles. Syrup Ferri Iodide and Easton's syrup are affected by light. Ergot, unless carefully dried and packed in a well-sealed receptacle, soon becomes mouldy and loses strength. All extracts deteriorate, unless securely put up in sealed pots. A Hypodermic morphine tablet, when kept too long, causes vomiting, which is due to a partial conversion of the alkaloid into apomorphine.

3. **Imperfect preparation.**—The impurities are derived either from a bad selection of crude drugs or chemical reagents, or are formed during the process of manufacture if not thoroughly removed. They can only be avoided by the scrupulous care of the manufacturing pharmacist. Tests are the only means of acertaining the purity of inorganic drugs.

4. **Adulteration** is the intentional admixture of foreign substances with a drug for fraudulent purposes. Many drugs are adulterated by traders. All highly priced drugs are liable to adulteration. Musk is mostly adulterated (see Musk) with catechu, earth, dried blood, &c. Quinine was at one time systematically adulterated, and Dr. Murrell mentions that once a large consignment of

quinine was sent out to India, containing not a trace of cinchona alkaloids. Powders, extracts, and liquid preparations are open to adulteration, and should therefore be bought from reliable and respectable manufacturers. Pure and genuine drugs can be easily obtained by paying reasonable prices.

The purity of an **inorganic** drug is ascertained by its chemical **tests**, which the students are expected to be familiar with. Dr. J. M. Bruce has prepared a table giving the common tests for impurities in **inorganic** drugs, which we quote below :—

	Impurity.	**Detected by**
"1. Impurities derived from the sources of the drug, or formed in the process of manufacture and imperfectly removed.	Water ...	... Bibulous paper ; dampness ; loss of weight by heat.
	Organic Matter	... Blackening on heating.
	Sulphuric Acid	... White precipitate with $BaCl_2$.
	Hydrochloric Acid	... White precipitate with $AgNO_3$.
	Phosphoric Acid	... Yellow precipitate with $AgNO_3$, soluble in HNO_3 and in NH_4HO.
	Carbonic Acid	... Precipitate with lime Water ; effervescence with acids.
	Sulphurous Acid	... Zinc and HCl, which yield H_2S.
	Nitric Acid ...	... H_2SO_4 and $FeSO_4$ which give a brown ring between the two fluids.
	Calcium ...	... White precipitate with ammonium oxalate.
	Arsenium ...	... Yellow precipitate with H_2S.
2. Impurities derived from the apparatus used	Metals, especially lead, iron and copper	... Precipitate with $(NH_4)_2S$, or H_2S ; and special tests.
3. Insufficient strength	... ...	... Volumetric tests.
4. Fraudulent adulterations	Various coloured earths	... Non-volatility ; insolubility in HNO_3.
	Cheap salts	... Various tests.
	Starch	... Blue color with iodine.
	Sugar	... Evaporation ; quantitative test.
	Chalk	... Effervescence with acids."

The purity of organic drugs can be ascertained by physical examination and quantitative tests.

THE BRITISH PHARMACOPŒIA AND PHARMACEUTICAL PROCESSES.

By a pharmacopœia we mean a book published under the authority of a recognised body, generally constituted by law, for the purpose of securing an uniformity of composition and strength of medicines, used in the treatment of disease. The General Medical Council of the United Kingdom, authorised by the Medical Act of 1858, issues and revises from time to time the British Pharmacopœia. The first B. P. was published in 1864, and the last in 1898. The Colonial Addendum is now in preparation. It is intended to be the standard and guide to the preparation of drugs in the British Empire. Other countries, as the United States, Germany, France, &c. also publish their own pharmacopœias, but they differ in many respects from the British. Even hospitals have their own special pharmacopœias for speedy dispensing. Although the B. P. is the legal standard, no medical man is bound to follow it.

The Indian Pharmacopœia, though published under the orders of Government, is not followed in India; moreover, it requires a revision.

The processes that are mentioned in the B. P. are called *official* or *officinal*. In the following pages, we shall give a brief description of some of these processes. Many of them, such as infusion, maceration, percolation, &c. belong to practical pharmacy, while many others, such as distillation, crystallisation, &c., come within the range of chemistry.

Bruising or Contusion is the process by which tough, hard and woody, or soft, elastic, and juicy substances are smashed or broken up in a roller-mill, or disintegrator, or on a small scale, in an iron mortar, so as to bring them to a form suitable to their being acted upon by a solvent, either for maceration, infusion, or decoction. As belladonna and hyoscyamus leaves, colchicum corms, broom tops, ergot, cloves, krameria root, &c.

Calcination or Incineration is the operation by which the drugs are exposed to high heat, to obtain their residues, after the watery and volatile matters have been driven off. This is best effected by putting the drugs in a crucible over a furnace. Magnesia and lime are prepared from their carbonates by this process.

Crystallisation is the process by which subsatnces are made to assume the form of crystals This is effected by (*a*) **evaporation** of a solution containing the substances to be crystallised, as in the case of alum and sulphate of iron; (*b*) by **fusion**, as in the case of certain metals and sulphur; (*c*) by **sublimation**, as in the case of corrosive sublimate; and (*d*) by **precipitation**, as in the case of iodide of mercury.

Cutting and Slicing are usually done by a wood cutter or a chopper. Roots, woods, and barks are cut or sliced before they are bruised or pulverised ; as gentian root, mezereon bark, sassafras root, &c. Orange peel is chopped.

Decoloration is the process by which we remove the colouring matters from alkaloidal substances, such as atropine, morphine, veratine. This is effected by treating their solutions or mixtures with dried and purified animal charcoal, and filtering afterwards.

Despumation is the process by which an organic fluid is boiled to remove its impurities, by skimming off or straining the scum that rises to the surface. The green extracts of the B. P. are thus purified. Syrups made by this process keep longer.

Desiccation or **Drying** is used in the preparation of most of the drugs of the B. P. Roots, barks, leaves, flowers, seeds &c. are either dried in the sun or in an artificially heated drying chamber made for the purpose. Such articles as would ferment or deteriorate in active principles by keeping, must be dried soon. The official salts, precipitates, or filtrates are recommended to be dried in a hot air chamber. In India and tropical countries, where the sun is very powerful, the process of drying can be very easily accomplished by an exposure to the sun's rays during the hot and dry months.

Digestion is a prolonged maceration at a temperature higher than that of the air.

Distillation is the method by which a liquid is first converted into a vapour by heat, and then the vapour is condensed by cold again into a liquid in another vessel, called a *receiver*. This is effected by a still and condenser. There are two other methods of distillation :—(*a*) **Dry distillation**, in which heat is applied to decompose a substance into volatile products, which did not exist in it before, and which are collected in a receiver. Acetic acid, and wood-tar are made by this process. (*b*) **Fractional distillation**, in which heat is applied to distil off different substances volatile at different temperatures from a mixture.

Elutriation is the process by which a substance is pulverised and mixed with water, the coarser grains falling down to the bottom, while the lighter and finer ones are drawn off with the water to another vessel, where deposition takes place slowly. By this process Creta præparata is made. Sometimes impurities, like sands, gravels, &c. are got rid of by this method.

Expression is the process by which we press out juices and oils from vegetable substances, as in the preparation of succi and green extracts, or squeeze out of the marcs liquids, as in the preparation of tinctures.

Filtration means the separation of liquids from solids from a mixture, through calico, flannel, felt, filtering or blotting paper, cotton wool or tow. When the solution is bright and clear, the filtration is good ; when muddy, it is bad.

Fusion, Liquefaction or **Melting** is the process by which we melt or liquefy any solid body by heat. This is effected by putting it in a suitable vessel or crucible over a heated furnace, or on a water, steam or sand bath. We employ this process in the preparation of plasters, ointments, suppositories, caustic sticks, &c.

Granulation is the process by which a coarsely crystallised substance is converted into a granular powder, by dissolving the former in water, and evaporating the solution to dryness by continuous stirring. Carbonate and citrate of potassium are thus made granular.

Levigation is the pulverisation of a solid in the presence of water, or any other liquid which would not dissolve it ; the finely comminuted particles being gathered with the washings, and allowed to deposit slowly, whilst the coarser particles are again ground with the water or liquid, and so on, until the whole of the solid is reduced to a condition of fine powder. Red precipitate may be thus reduced. It differs from elutriation in this respect, that the refuse or residue is not thrown away.

Lixiviation means the separation of a soluble salt, from a mixed or compound solid, by dissolving the latter in water, pouring off the supernatent liquid to another vessel, and evaporating it to dryness, leaving the insoluble residue behind. The solution is called a "*Lye.*" Pearl ash is thus prepared from wood ashes.

Pulverisation is the grinding of solids into powders. All salts and crystalline bodies are best powdered in a wedge-wood mortar. Vegetable substances, such as roots, barks, leaves, &c. should be thoroughly dried, before they are ground in an iron mortar or in a roller-mill.

Scaling is the process by which the scale preparations of drugs are made. It consists in spreading out in a thin layer, the concentrated solution of a drug on a glass plate, and allowing it to dry. The dried film is then separated and broken up. The scale iron preparations, such as Ferri et Quin. Citras, Ferri et Ammon. Citras, &c., are made by this process.

Sifting is the method by which we separate finer powders from coarser ones, by means of a sieve, which is made of either wire, horse-hair or muslin, of varying degrees of closeness. The B. P. directs a drug in no. 5, 10, 20, 30, or 40 powder, and thereby means a degree of disintegration, as represented by the number of parallel wires in either transverse direction contained within the linear inch of a sieve.

When the soft pulp of fruits like figs, baels, prunes or tamarinds, is required to be sifted, the operation is called "**pulping**", which requires a great force in squeezing out the pulp through the sieve.

Solution :—When a substance is dissolved in a liquid, the process is known as solution. The liquid that dissolves is called a *solvent*, and the substance so dissolved a *solute*. It is *simple*, when the substance can be recovered from the solvent, without any change, and *chemical* when it cannot be so recovered.

Standardization is the method adopted to obtain a definite uniformity in the strength of certain vegetable preparations, containing active or alkaloidal principles, such as the extract of nux vomica, physostigma, and strophanthus, &c.

Sublimation is the operation by which a solid is first vapourised by heat, and then the vapour is condensed as a deposit on the surface of another vessel, either *en masse*, in which case it is called a **sublimate**, as corrosive sublimate ; or in a small feathery pulverulent state, known as **flowers**, as flowers of sulphur.

WEIGHTS AND MEASURES OF THE BRITISH PHARMACOPŒIA, IMPERIAL SYSTEM.

Measures of Mass.

1 Grain	gr.	
1 Ounce (Avoir)	oz.	= 437·5 grains.
1 Pound	lb. = 16 ounces	= 7000 grains.

Measures of Capacity.

1 Minim	min.	
1 Fluid Drachm	fl. drm.	= 60 minims.
1 Fluid Ounce	fl oz	= 8 fluid drachms.
1 Pint	O.	= 20 fluid ounces.
1 Gallon	C.	= 8 Pints.

Measures of Length.

1 Inch	in.	
1 Foot	ft.	= 12 inches.
1 Yard	yd.	= 36 inches.

Relation of Volume to Mass.

1 Minim	is the Volume at 62°F. of	0·9114583	grain of water.
1 Fluid drachm	,, ,, ,,	54·6875	grains of water.
1 Fluid Ounce	,, 1 Ounce or	437·5	grains of water.
1 Pint	,, 1·25 pounds or	8750·0	grains of water.
1 Gallon	,, 10 pounds or	70000·0	grains of water.

109·7143 minims[*] = the volume at 62°F. of 100 grains of water.

---

[*] Taken as 110 minims throughout the Pharmacopœia.

WEIGHTS AND MEASURES OF THE METRIC SYSTEM.

Measures of Mass.

1 Milligramme = the thousandth part of one grm. or 0·001 grm.
1 Centigramme = the hundredth part of one grm. or 0·01 grm.
1 Decigramme = the tenth part of one grm. or 0·1 grm.
Gramme = {weight of one millilitre of distilled water at 4°C. (39·2°F.)} 1·0 grm.
1 Dekagramme = ten grammes or 10·0 grm.
1 Hectogramme = one hundred grammes or 100·0 grm.
1 Kilogramme = one thousand grammes or 1000·0 grm.

Measures of Capacity.

1 Millilitre = the Volume at 4°C. of 1 grm. of water.
1 Centilitre = " " of 10 grm. of water.
1 Decilitre = " " of 100 grm. of water.
1 Litre = " " of 1000 grm. (1 Kilog.)

Measures of Length.

1 Millimetre = one thousandth part of one metre or 0·001 metre.
1 Centimetre = one hundredth part of one metre or 0·01 metre.
1 Decimetre = one tenth part of one metre or 0·1 metre.
1 Metre 1·0 metre.

Relation of Cubic measures to Measures of Capacity.

1 Cubic Centimetre = 0·99984 millilitre.
1 Cubic Decimetre = 0·99984 litre, or 1000 cub. Centim.

1·00016 cubic centimetres = 1 Millilitre.
1·00016 cubic Decimetres = 1 litre, or 1000 millilitres.

RELATION OF THE IMPERIAL STANDARDS TO THE METRIC STANDARDS.

Standards of Mass.

1 Pound = 453·59243 grammes.
1 Ounce = 28·34953 grammes, or 28·35 grm. nearly.
1 Grain = 0·064798918 gramme, or 0·0648 grm. nearly.

Standards of Capacity.

1 Gallon = 4·5459631 litres.
1 Pint = 0·5682454 litre or {568·336 cubic centimetres nearly.
1 Fluid Ounce = 0·0284123 litre or {28·417 cubic centimetres nearly.
1 Fluid Drachm = 0·003552 litre or {3·552 cubic centimetres nearly.
1 Minim = 0·000059 litre or {0·059 cubic centimetre nearly.

Standards of Length.

1 Yard = 0·914399 metre.
1 Foot = 0·30480 metre = 30·48 centimetres.
1 Inch = 0·02540 metre = 25·40 millimetres.

RELATION OF THE METRIC STANDARDS TO THE IMPERIAL STANDARDS.

Standards of Mass.

1 Milligramme = 0·015 grain nearly.
1 Centigramme = 0·154 grain nearly.
1 Decigramme = 1·543 grains nearly.
1 Gramme = 15·4323564 grains.
1 Kilogramme = 2lb. 3 oz. 119·8564 gr.
or 15432·3564 grains.

Standards of Capacity.

1 Cubic Centimetre = 16·9 minims nearly.
1 Litre = 1·75980 pints,
or 1 pint 15 fl. oz. 1 fl. dr. 34 m. nearly

Standards of Length.

1 Millimetre = 0·039370 inch.
1 Centimetre = 0·39370 inch.
1 Decemetre = 3·9370 inches.
1 Metre = 39·370113 inches,
or 1 yd. 3·37 inches nearly

Formulæ for Converting from one Scale to another.

To convert	grammes into grains	× 15·432
,,	,, ounces (avoir)	× 0·03527
,,	kilogrammes into pounds	× 2·2046
,,	grains into grammes	× 0·0648
,,	avoir. ounces into grammes	× 28·35
,,	troy ounces into grammes	× 31·104
,,	cubic centimetres into fluid ounces imperial	× 0·0352
,,	litres into fluid ounces imperial ...	× 35·2
,,	fluid ounces into cubic centimetres ...	× 28·42
,,	pints into litres	× 0·568
,,	metres into inches	× 39·37
,,	inches into metres	× 0·0254

Indian Domestic Weights.

1 Rupee or 1 tola = 180 grains
½ „ „ ½ „ = 90 „
¼ „ „ ¼ „ = 45 „
⅛ „ „ ⅛ „ = 22·5 „
1 Copper pice = 100 „

OFFICIAL OR PHARMACOPŒIAL PREPARATIONS.

The official preparations are sometimes wrongly called *Galenical* from Galen, who employed the vegetable drugs in the treatment of disease, but the sense of the term has become widened with the progress of pharmacy.

Most of the drugs cannot be administered in their natural state. They are either too nauseous, too bulky, or contain some principles which are injurious to health or life. They are, therefore, submitted to certain processes as prescribed by the British pharmacopœia, in order to render them fit for administration, and also to help their preservation and storing, so as to maintain their uninterrupted supply during all seasons of the year. In the following pages we have given all the *official preparations* of the B. P. of 1898 in a tabular form, with their compositions, strengths, doses, and in many instances, their actions and uses, so as to enable a student to commit them to memory with as little trouble as possible. But, it is only by repeated references. that he will be able to master this the most difficult part of Materia Medica.

Aceta. Vinegars are solutions of drugs in acetic acid, not in Vinegar. They are three in number :—

Acetum.	Preparation.	Strength	Dose.	Action.
Cantharidis	Cantharides bruised 2 ozs., glacial acetic acid, distilled water equal parts, to 1 pt., by maceration and percolation.	1 in 10	Used externally.	Epispastic, for blistering.
Ipecacuanhæ	Liquid extract of ipecac. 1 oz., alcohol 90 p.c. 2 ozs., and diluted acetic acid 17 ozs., or 1 pt., by mixture.	...	10 to 30 m.	Expectorant, in colds, coughs and bronchitis.
Scillæ ...	Squill bruised 2½ ozs., and diluted acetic acid to 1 pt., by maceration.	1 in 8	10 to 30 m	Expectorant, diuretic.

Aquæ. Waters.—With the exception of distilled water, all Aquæ are weak and simple solutions of volatile oils in distilled water obtained by distillation or by trituration and filtration. They are 15 in number—

Aqua.	Preparation.	Dose.	Action.
Anethi ...	Dill fruit 1 lb., and water 2 gals. distilled to 1 gal.	⅓ to 2 ozs.	Carminative-Efficacious in infantile colic.
Anisi ...	Anise fruit 1 lb and water 2 gals., distilled to 1 gal.	½ to 2 ozs.	An antispasmodic and carminative vehicle.
Aurantii Floris	Commercial water as obtained by distillation of flowers of bitter-orange. It is a saturated solution of the volatile oil of fresh flowers.	1 to 2 ozs.	A flavouring agent
Camphoræ ...	Camphor 70 grs., alcohol 90 p.c. *q.s.* and distilled water 1 gal. by solution. Strength ½ gr. in 1 oz.	1 to 2 ozs.	Stimulant and antispasmodic. As a vehicle.
Carui ...	Caraway fruit 1 lb. and water 2 gals. distilled to 1 gal.	1 to 2 ozs.	A carminative vehicle.
Chloroformi ...	Chloroform 30 ms. and distilled water 23 ozs. by solution. Its strength is 1 in 400. *i.e.* half of the same of *P. B.* 1885.	1 to 2 ozs.	A flavouring agent
Cinnamomi ...	Cinnamon bark bruised 1 lb. and water 2 gals. distilled to 1 gal.	1 to 2 ozs.	A carminative vehicle.
Destillata ...	Distilled from good natural potable water.	—	A vehicle.
Fœniculi ...	Fennel fruit 1 lb. and water 2 gals. distilled to 1 gal.	1 to 2 ozs.	Antispasmodic for infantile colic.
Laurocerasi ...	Fresh cherry laurel leaves 1 lb. and water 2½ pts.; by distillation and standardization. Contains $\frac{1}{10}$ p. c. of hydrocyanic acid.	½ to 2 drs. B. P.	Nervine, gastric and cutaneous sedative.
Menth. Pip. ..	Oil of peppermint 77 ms. and water 1½ gals. distilled to two-thirds.	1 to 2 ozs.	An antispasmodic and carminative vehicle.

Aqua.	Preparation.	Dose.	Action.
Menth. Viridis	Oil of spearmint 77 ms. and water 1½ gals. distilled to two-thirds.	1 to 2 ozs.	An antispasmodic and carminative vehicle.
Pimentæ ...	Pimento bruised 8 ozs. and water 2 gals. distilled to 1 gal.	1 to 2 ozs.	A carminative vehicle.
Rosæ ...	Commercially distilled from the flowers of *Rosa damascena*. It is a saturated solution of the volatile oil.	1 to 2 ozs.	A flavouring agent.
Sambuci ...	Fresh elder flowers 10 lbs, or an equivalent quantity of flowers preserved in salt while fresh, and water 5 gals. distilled to one-fifth.	Used externally.	A fragrant basis for skin lotions.

All aquæ can be divided into 3 groups :—

1. *Simple solutions* ; as aqua camphoræ, aqua chloroformi, aqua aurantii and aqua rosæ ; of these, the last two, as obtained in commerce, are saturated solutions, and are to be diluted with.

2. *Solutions promoted by distillation* ; as aqua menth. pip. and aqua menth. virid.

3. *Distilled decoctions* ; as aqua anethi, and all the rest, except those mentioned above.

No doses are given in the B. P., except that of Aqua Laurocerasi which is given in ½ to 2 drs. on account of the Hydrocyanic Acid it contains. The doses given in the table are unofficial.

Acida Diluta. Diluted Acids are strong acids diluted with distilled water. They are 8 in number :—

Acidum.	Preparation.	Dose.	Action and use.
Aceticum Dil. ...	Acetic acid 2½ fl. ozs , water to 1 pint.	½ to 2 drs.	Refrigerent and diuretic. To allay thirst in fevers, cholera, and to reduce temperature.
Hydrobromicum Dil.	A solution containing 10 % of hydrogen bromide by weight.	15 to 60 ms.	Hypnotic and sedative. To prevent cinchonism it is mixed with quinine.

Acidum.	Preparation.	Dose.	Action and use.
Hydrochloricum Dil.	Hydrochloric acid 6 fl. ozs., water to 1 pint.	5 to 20 m.	Refrigerent and tonic. In acid dyspepsia, chronic gastric complaints, fevers, &c.
Hydrocyanicum Dil.	A solution containing 2 % of hydrogen cyanide by weight.	2 to 6 m.	Sedative. A deadly *poison*. In vomiting, painful gastric disorders, hiccough, &c.
Nitricum Dil. ...	Nitric acid 3 fl. ozs. and 7 fl. drs., water to 1 pint.	5 to 20 m.	Tonic, cholagogue. In phosphatic calculi as injection, dyspepsia.
Nitro-hydrochloricum Dil.	Nitric acid 3 fl. ozs., hydrochloric acid 4 fl. ozs., water 25 fl. ozs.	5 to 20 m.	Tonic, refrigerent, cholagogue. In dyspepsia, congestion of liver.
Phosphoricum Dil.	Phosphoric acid 3 fl. ozs., water to 1 pint.	5 to 20 m	Tonic, refrigerent. In rickets, diabetes, phosphatic diathesis.
Sulphuric Dil.	Sulphuric acid 1 fl. oz. & 5¼ fl. dr., water to 1 pint.	5 to 20 m.	Tonic, astringent. To check hæmorrhages, diarrhœa, cholera, sweating of phthisis.

The dosage of all varies from 5 to 20 minims, except those of :— Acid. Hydrocyanic. Dil. 2 to 6 ms , Acid. Hydrobromic. Dil. 15 to 60 ms. and Acid. Acetic. Dil. ½ to 2 drs.

Chartæ. Papers :—Cartridge papers coated with active medicinal agents, and used like a plaster. There is only one in the B. P.

Charta Sinapis. Mustard Paper :—Remove the fixed oil from black and white mustard seeds with benzol by percolation, and mix the dried and powdered residue 75 grs. with 5 drs of solution of India-rubber. Spread this mixture on paper and dry. The paper should be dipped in tepid water before use.

Collodia. Collodions are solutions of drugs in collodion, or solution of pyroxylin in ether and alcohol. They are 3 in number :—

Collodium.	Ingredients.	Action and use.
Collodium ...	Pyroxylin 1 oz., ether 36 ozs., alcohol 90% 12 ozs.	A protective to wounds, &c.
Flexile ...	Collodion 12 ozs., Canada turpentine ½ oz., castor oil ¼ oz.	Does not crack. An excellent application for erysipelas, fissured nipples, scalp wounds, sprains, &c.
Vesicans ...	Blistering liquid 20 ozs., pyroxylin ½ oz.	An effective vesicant.

Confectiones. Confections, Electuaries or Conserves are soft preparations of drugs, made like paste with sugar or honey, either to give them a pleasant and agreeable taste or to preserve them. There are only 4 in the B. P :—

Confectio.	Ingredients.	Strength.	Dose.	Action and use.
Piperis ... (Ward's paste).	Powdered black pepper 2 ozs., carraway seeds 3 ozs., honey 15 ozs.	1 in 10	60 to 120 grs.	Stimulant, carminative. In hæmorrhoids.
Rosæ Gallicæ ...	Fresh red-rose-petals 1 lb., refined sugar 3 lbs.	1 in 4	—	As a basis for pill mass & linctus.
Sennæ ...	Powdered senna 7 ozs., powdered coriander 3 ozs., figs 12 ozs., tamarinds 9 ozs., cassia pulp 9 ozs., prunes 6 ozs-, extract of liquorice 1 oz., sugar 30 ozs., water *q. s.*	1 in 11	60 to 120 grs.	A safe and elegant laxative in chronic constipation.
Sulphuris	Sublimed sulphur 4 ozs., acid. pot. tartrate 1 oz., tragacanth 18 grs., syrup 2 ozs., tincture of orange ½ oz., glycerin 1½ ozs.	1 in 2½	60 to 120 grs.	A gentle laxative and alterative in piles.

Decocta. Decoctions :—3 in number. They are vegetable solutions prepared by boiling with distilled water and straining. Aloes is only made in a covered pot.

Decoctum.	Ingredients.	Strength.	Dose.	Action and use.
Aloes Co...	Extract of Barbados aloes ½ oz., myrrh, saffron and potas. carbonate of each ¼ oz, extract of liquorice 2 ozs., compound tincture of cardamoms 15 ozs, water to 50 oxs.	1 in 100.	½ to 2 ozs.,	Cathartic and emmenagogue. In chronic constipation, amenorrhœa, and obstinate diarrhœa (Whitla).
Granati Corticis	Powdered pomegranate bark 4 ozs., water to 1 pt.	1 in 5.	½ to 2 ozs.,	Astringent and anthelmintic. In diarrhœa, dysentery and tapeworm.
Hæmatoxyli ...	Logwood in chips 1 oz cinnamon bark bruised 70 grs., water to 1 pt.	1 in 20.	½ to 2 ozs.	An astringent vehicle.

Effervescents Granular, or those preparations that effervesce when mixed with water. All are granular except Effervescent Tartarated Soda Powder, which being a powder is given under the head of powders in the B. P. They are prepared by the admixture of acids and alkalis with or without sugar. Caffeine citrate, Mag. sulphate, and Sodium Citro-Tartrate contain sugar, while Sodium Phosphate, Sodium Sulphate, and Lithium Citratate do not.

All effervescing preparations are agreeable to take.

The following are the B. P. granular effervescing preparations, the quantities of which are given in ounces :—

Effervescent.	Composition.	Dose.	Action and use.
Caffeine Citrate ...	Sodium bicarb. 51, tartaric acid 27, citric acid 18, sugar 14, caffeine citrate 4.	60 to 120 grs	Cardiac tonic, diuretic. In headache and migraine.
Lithium Citrate ...	Sod. bicarb. 58, tartaric acid 31, citric acid 21, lithium citrate 5.	60 to 120 grs.	Diuretic.
Magnesium Sulphate ...	Mag. sulph. 50, sodium bicarb. 36, tartaric acid 19, citric acid 12½, sugar 10½.	60 to 240 grs., ½ to 1 oz. for a single dose.	Antacid and cathartic.
Sodium Citro-tartrate ...	Sod. bicarb. 51, tartaric acid 27, citric acid 18, sugar 15.	60 to 120 grs.	Refrigerent, laxative and antacid.
Sodium Phosphate ...	Sod. phosphate 50, sod. bicarb. 50, tartaric acid 27, citric acid 18.	60 to 120 grs., ¼ to ½ oz. for a single dose.	A mild antacid, aperient in large doses, diuretic and antilithic in small doses.
Sodium Sulphate ...	Sod. bicarb. 50, sod. sulph. 50, tartaric acid 27, citric acid 18.	60 to 120 grs., ¼ to ½ oz. for a single dose	Hydragogue purgative.
Tartarate Soda powder...	Described in the table of powders. (q. v.)	—	Purgative.

Emplastra. Plasters :—12 in number. They are made of adhesive substances spread upon cloth or leather so as to adhere to the skin. They are applied for the purpose of holding medicinal substances in contact with the body, of acting as a protective and support, and of bringing the edges of a wound together.

Emplastrum.	Materials used.	Strength.	Action and use.
Ammoniaci *Cum* **Hydrargyro**	Ammoniacum 12 ozs, mercury 3 ozs., olive oil 56 grs. sublimed sulphur 8 grs.	1 of Hg. in 5	Resolvent and a local stimulant. In glandular swelling, syphilitic nodes and chronic synovitis.
Belladonnæ	Liquid extract of belladonna 4 ozs., resin plaster 5 ozs.	2 in 3 or 5 % of alkaloids.	A local anodyne. In lumbago, neuralgia, cardiac pain, swollen and painful glands.
Calefaciens (*Warming plaster*).	Cantharides in coarse powder, yellow bees-wax, resin, each 4 ozs., resin plaster 3¼ lbs., soap plaster 2 lbs., boiling water 1 pt.	1 in 24 of Cantharides.	A local stimulant.
Cantharidis	Cantharides in powder 3½ ozs., yellow bees-wax 2 ozs., lard 2 ozs., resin 2 ozs., soap-plaster ½ oz.	1 in 3 nearly	Vesicant. Used for blistering.
Hydrargyri	Mercury 3 ozs., olive oil 56 grs., sublimed sulphur 8 grs., lead plaster 6 ozs.	1 in 3	Resolvent.
Menthol ...	Menthol 1½ ozs., yellow bees-wax 1 oz., resin 7½ ozs.	3 in 20	A local analgesic. In neuralgic pains.
Opii ...	Opium in fine powder 1 oz., resin plaster 9 ozs.	1 in 10	A local anodyne.
Picis ...	Burgandy pitch 26 ozs., Frankincense 13 ozs., resin 4½ ozs., yellow bees-wax 4½ ozs., olive oil 2 ozs., water 2 ozs.	1 in 2	Rubefacient. Applied to chest for chronic pulmonary diseases, to loins for lumbago and rheumatism.
Plumbi ...	Lead oxide 1 lb., olive oil, 2 lbs., water 16 ozs. or *q.s.*	——	Sedative and protective.
Plumbi Iodidi ...	Lead iodide 2 ozs., lead plaster 1 lb., resin 2 ozs.	1 in 10	Alterative and resolvent. In chronic indolent enlargements.
Resinæ ... (*Adhesive plaster*)	Resin 4 ozs., lead-plaster 2 lbs., hard soap 2 ozs.	1 in 9½	Adhesive. For strapping wounds, ulcers.
Saponis ...	Hard soap 6 ozs., lead plaster 2¼ lbs., resin 1 oz.	1 in 7	Protective. In bed-sores, boils and corns.

Extracta. Extracts :—39 in number. Prepared mostly by evaporating fresh juice or soluble ingredients of plants. According to their mode of preparation, the Extracts can be grouped under 7 heads, *viz* :—1. Fresh Extracts. 2. Green Extracts. 3. Aqueous Extracts. 4. Liquid Extracts. 5. Alcoholic Extracts. 7. Ethereal Extracts. 7. Dry Extracts. But, if we are to divide them according to their physical consistence, they come under three groups, *viz* ;—(1). **Hard, dry or brittle,** (2). **Semisolid,** and (3). **Liquid.**

1. **Fresh Extracts** are prepared by heating the expressed juice to 212°F. to coagulate the albumen, and by filtering and evaporating the filtrate at 160°F. They are two in number :—

Extractum.	Source.	Process.	Menstruum	Dose.
Colchicum ...	Juice of fresh corms.	Ex. & E.	nil.	¼ to 1 gr.
Taraxacum...	Juice of fresh roots.	Do.	nil.	5 to 15 grs.

2. **Green Extracts** generally are prepared by bruising and pressing out the juice of drugs, and then heating it to 130°F. The green colouring matter is filtered and laid aside. The strained fluid is heated to 200°F. to coagulate the albumen, which would decompose the extract if retained, and filtered. The filtrate is evaporated on a water-bath to the consistence of a thin syrup. The green colouring matter previously separated and passed through a hair sieve is added to the filtrate, and the whole, after being stirred, is evaporated to the consistence of a soft extract at a temparature below 140°F.

Extractum.	Source.	Process.	Menstruum	Dose.
Belladonnæ ... **viride**	Juice of fresh leaves and young branches.	Ex. & E.	nil.	¼ to 1 gr.
Hyoscyami ... **viride**	Juice of fresh leaves, flowering tops and young branches.	Do.	nil.	2 to 8 grs.

3. **Aqueous or Watery Extracts** are prepared by dissolving, macerating, infusing or boiling drugs in cold or hot distilled water, and evaporating the solution, infusion or decoction, as the

Note :—Ex = Expression. E = Evaporation.

case may be, to the consistence of a soft extract. They are 7 in number as under :—

Extractum.	Source.	Process.	Menstruum.	Dose.
Aloes Barb. ...	Barbados aloes 1 lb.	S. & E.	Boiling water.	1 to 4 grs.
Anthemidis ...	Dried flowers 1 lb. and oil of chamomile 15 ms.	D. & E.	water.	2 to 8 grs.
Cascaræ Sagradæ	Powdered bark.	M P. & E	water.	2 to 8 grs.
Gentianæ ...	Sliced root dried.	I. D. & E.	water.	2 to 8 grs.
Glycyrrhizæ ...	Dried root 1 lb.	M. & E.	water.	—
Krameriæ ...	Dried root.	M. P. & E.	water.	5 to 15 grs.
Opii ...	Sliced opium 1 lb.	S. & E.	water.	¼ to 1 grs.

The B. P. has given no dose for Ext. Gentian., though in the form of a stick, it is often kept in the mouth for colds and coughs. The extracts of Aloes Barb., Cascara Sagrada, and Krameria are *solid* and the rest *semisolid.*

4 **Liquid Extracts** are prepared either from *concentrated infusions* of drugs, with alcohol added for their preservation, or alcoholic extracts dissolved in diluted alcohol. Opium alone is made from its semisolid extract. They are 17 in number as under :—

EXTRACTUM.	INGREDIENTS.	ALCOHOL P. C. IN THE MENSTRUUM.	PROCESS.	STRENGTH.	DOSE.
Belladonnæ ... Liquid.	Belladonna root.	90	M. & P.	¾gr. in 110 m (alkaloids).	...
Cascaræ Sagradæ Liq.	bark 20 ozs.	90	M. & P	1 in 1	½ to 1 dr.
Cimicifugæ Liq.	Cimicifuga 20 ozs.	90	M. & P.	1 in 1	5 to 30 ms.
Cinchonæ Liq.	Red cinchona-bark 20 ozs., hydrochloric acid 5 drs., glycerin 2½ ozs. & water *q. s.*	90	M. & P.	5 grs. in 110 ms. (alkaloids)	5 to 15 ms.
Cocæ Liq. ...	Leaves 20 ozs.	60	M. & P.	1 in 1	½ to 1 dr.
Ergotæ Liq. ...	Ergot 20 ozs. and water 7½ pt.	90	I. & E.	1 in 1	10 to 30 ms.

Note :—D = Decoction. E = Evaporation. Ex. = Expression. I = Infusion. M = Maceration. P = Percolation. S = Solution.

EXTRACTUM.	INGREDIENTS.	ALCOHOL P. C. IN THE MENSTRUUM.	PROCESS.	STRENGTH.	DOSE.
Glycyrrhizæ ... Liq.	Root 20 ozs., water 5 pt.	90	M. & E.	s.g. 1·200	½ to 1 dr.
Hamamelidis Liq.	Leaves 20 ozs.	45	P.	1 in 1	5 to 15 ms.
Hydrastis Liq.	Hydrastis 20 ozs.	45	P.	1 in 1	5 to 15 ms.
Ipecacuanhæ... Liq.	Root 1 lb., slaked lime 700 grs.	90	P.	2 to 2¼ grs. in 110 ms. (alkaloids)	½ to 2 ms. as an expectorant, 15 to 20 ms. as an emetic.
Jaborandi Liq.	Leaves 20 ozs.	45	P.	1 in 1	5 to 15 ms.
Nucis Vomicæ Liq.	Seeds, 1 lb.	70 & 90	M. & P.	1½ grs. in 110 ms. (strychnine)	1 to 3 ms.
Opii Liq. ...	Extract of opium ¾ oz and water 16 ozs.	90	S.	¾ gr. in 110 ms. (morphine).	5 to 30 ms.
Pareiræ Liq.	Pareira root	90	M. & P.	extractives	½ to 2 drs.
Sarsæ Liq. ...	Sarsaparilla powder 20 ozs., glycerin 2 ozs.	20	P.	1 in 1	2 to 4 drs.
Taraxaci Liq.	Root 20 ozs.	60	M.	1 in 1	½ to 2 drs.

From the above table it will be gathered, that all the liquid extracts require alcohol of various strengths, either for their preparation or for their preservation. Liquid extract of male fern being prepared with ether is given in the table of **Ethereal Extracts.**

In India and tropical countries, any Liquid Extract containing less than ¼th of its weight of alcohol 90 p. c., may have the same increased to one-fourth for better preservation.

5. **Alcoholic Extracts** are prepared by treating the drugs with alcohol of different strengths and *evaporating* the tincture afterwards. Properly speaking, they are 11 in number, but Ext. Euonymi Siccum and Ext. Stropanthi being in the form of a dry powder, though prepared with alcohol, are grouped under the head of **Dry Extracts**. Many Liquid Extracts though prepared with the aid of alcohol are not given under Alcoholic Extracts.

Note :—E = evaporation. I = Infusion. M = Maceration. P = Percolation. S = Solution.

Extractum.	Ingredients.	Process.	Menstruum.	Dose.
Bellad. Alcohol.	Liquid Extract of Belladonna.	E.	Milk-sugar	¼ to 1 gr.
Cannabis Ind.	Dried flowering tops.	P.	Alcohol 90%	¼ to 1 gr.
Colocynth. Co.	Colocynth pulp 6 ozs., Extract of Barbados aloes 12 ozs., scammony resin 4 ozs., curd soap in shavings 4 ozs., and cardamom in powder 1 oz.	M.	Alcohol 60% 1 gallon	2 to 8 grs.
Ergotæ, ... (*Ergotin*)	Ergot 20 ozs., sodium carbonate 175 grs.	P.	Alcohol 60% *q. s.*, water *q.s.* acid. hydroclor. dil. 7½ drs.	2 to 8 gr.
Jalapæ ...	Powdered root 1 lb.	M. & E.	Alcohol 90% 4 pts., water 1 gallon.	2 to 8 grs.
Nucis Vomicæ	Liquid extract of nux vomica 11 ozs. (5% strychnine)	E.	Milk-sugar *q.s.* (standardised)	¼ to 1 gr.
Physostigmatis	Dried powdered bean 1 lb.	M. & P.	Alcohol 90% 4 pts., milk-sugar *q. s.*	¼ to 1 gr.
Rhei ...	Dried powdered root	M. & P.	Alcohol 60%	2 to 8 grs.
Stramonii ...	Dried powdered seeds	P.	Alcohol 70%	¼ to 1 gr.

6. **Ethereal Extracts** are prepared by percolating dry drugs with ether. There is only 1 in the B. P. :—

Extractum.	Ingredient.	Process.	Menstruum.	Strength.	Dose.
Filicis Liq.	Dry rhizome.	P.	Ether.	10 yield 1	45 to 90 ms.

7. **Dry Extracts**, sometimes called **Abstracts**, are alcoholic extracts mixed with an inert powdered substance and then dried and powdered. They are 2 in number :—

Extractum.	Source.	Process.	Menstruum.	Dose.
Euonymi Siccum	Powdered bark.	P.	Alcohol 45% *q. s.* (Calc. phosp. *q. s.* to standardise).	1 to 2 grs.
Strophanthi ...	Dried strophanthus seeds.	P.	Purified ether *q. s.*, alcohol 90% *q. s.*, (milk-sugar *q. s.* to standardise).	¼ to 1 gr.

Phosphate of lime and sugar of milk are used to bring them to a standard strength.

Glycerina. **Glycerins** are the solutions of drugs in plain glycerin or glycerin and water. They are 9 in number :—

GLYCERINUM.	INGREDIENTS.	STRENGTH BY WEIGHT	STRENGTH BY VOLUME	ACTION AND USE.
Acidi Borici ...	Boric acid powder 6 ozs., glycerin *q.s.* to 20 ozs. by weight.	6 in 20.	6 in 16.	A local antiseptic. In aphthous sores.
Acidi Carbolici	Phenol 1 oz., glycerin *q.s.* to 5 ozs.	1 in 6¼.	1 in 5.	A local antiseptic and parasiticide. In tinea.
Acidi Tannici	Tannic acid 1 oz glycerin *q.s.* to 5 ozs.	1 in 6¼.	1 in 5.	A local astringent. In sore throat and tonsillitis.
Aluminis ...	Alum in powder 1 oz., water 3 drs., glycerin *q. s.* to 6 ozs.	1 in 7½.	1 in 6.	A local astringent. In enlarged tonsils.
Amyli	Starch 1 oz , glycerin 6½ ozs., water 1½ ozs.	1 in 10.	1 in 9.	A local emollient.
Boracis... ...	Borax 1 oz., glycerin 6 ozs.	1 in 8½.	1 in 6¾.	A local antiseptic and emollient.
Pepsini... ...	Pepsin 800 grs , hydrochloric acid 110 ms., glycerin 12 ozs., water *q.s.*	———	5 grs. in 1 dr.	A digestive adjuvant. (Dose.—1 to 2 drs.)
Plumbi Subacetatis ...	Lead acetate 5 ozs., lead oxide 3½ ozs., glycerin 1 pt., water 12 ozs.	1 in 6.	1 in 4.	A local astringent and sedative.
Tragacanthæ (*a substitute for Proctor's paste*)	Tragacanth ½ oz., glycerin 1½ ozs. distilled water ½ oz.	1 in 5½	———	A good pill excipient.

Though the official glycerins are intended to be simple solutions, yet Glyc. Plumbi Subacetatis and Glyc. Tragacanthæ are not so. The former is a chemical solution and the latter a pseudo-solution. Glyc. acidi Tannici is now prepared by simple trituration without the aid of heat ; consequently the product is pale. Glyc. Amyli cannot be made on a water-bath, because heat is not high enough to tumefy the starch granules. Use a porcelain dish with a piece of wire gauze between it and the flame, and do not stop stirring until the clear point is reached, when heat is to be removed. Glyc. Boracis is only triturated now, instead of being triturated or heated according to the dispenser's choice as before. Glyc. Acidi Borici is nothing but a diluted imitation of the patented Boro-Glyceride.

Infusa. Infusions are watery solutions of vegetable principles, prepared by soaking in cold or boiling water, coarsely powdered or bruised crude drugs for a certain time in a covered vessel, and then straining the liquid. They are 22 in number. 20 are prepared by boiling distilled water. Quassia and Calumba are infused in cold water. The product should not measure any particular quantity. All of them are made with 1 pint of water. All infusions become inky with persalts of iron, except those of Quassia and Calumba. They should always be prepared fresh. To a student, the infusion of Digitalis is the most important. It contains 60 grs, to a pint, and the dose is only 2 to 4 drs. The dose of the rest varies from ½ to 1 or 2 ozs.

Infusum.	Ingredients.	Strength.	Time in hour.	Dose.
Aurantii ...	Dried bitter-orange peel cut small 1 oz. and boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Aurantii Co. ...	Dried bitter-orange peel cut small ½ oz., fresh lemon peel cut small ¼ oz., cloves bruised 55 grs., boiling water 1 pt	1 in 40	¼	½ to 1 oz.
Buchu ...	Buchu leaves broken 1 oz. and boiling water 1 pt.	1 in 20	¼	1 to 2 ozs.
Calumbæ ...	Calumba root thinly sliced 1 oz. and cold water 1 pt.	1 in 20	½	½ to 1 oz.
Caryophylli ...	Cloves bruised ½ oz. and boiling water 1 pt.	1 in 40	¼	½ to 1 oz.
Cascarillæ ...	Powdered cascarilla 1 oz., boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Chiratæ ...	Chiretta cut small 1 oz. and boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Cinchonæ Acidum ...	Red bark powdered 1 oz., aromatic sulphuric acid 2 drs. and boiling water 1 pt.	1 in 20	1	½ to 1 oz.
Cuspariæ ...	Cusparia bark powdered 1 oz., boiling water 1 pt.	1 in 20	¼	1 to 2 ozs.
Digitalis ...	Digitalis leaves powdered 60 grs. and boiling water 1 pt.	60 grs. in 1 pt., or 1 in 160	¼	2 to 4 drs.
Ergotæ ...	Ergot freshly crushed 1 oz., boiling water 1 pt.	1 in 20	¼	1 to 2 ozs.
Gentian. Co. ...	Gentian root thinly sliced ¼ oz., dried bitter-orange peel cut small ¼ oz., fresh lemon peel cut small ½ oz., boiling water 1 pt.	1 in 80	¼	½ to 1 oz.

Infusum.	Ingredients.	Strength.	Time in hour.	Dose.
Krameriæ ...	Krameria root bruised 1 oz., boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Lupuli ...	Hops freshly broken 1 oz. and boiling water 1 pt.	1 in 20	¼	1 to 2 ozs.
Quassiæ ...	Quassia wood finely rasped 88 grs., cold water 1 pt.	1 in 100	¼	½ to 1 oz.
Rhei ...	Rhubarb root in thin slices 1 oz., boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Rosæ Acidum	Red-rose petals broken ½ oz. acid. sulph. dil. 2 drs. boiling water 1 pt.	1 in 40	¼	½ to 1 oz.
Scoparii ...	Broom tops dried and bruised 2 ozs. and boiling water 1 pt.	1 in 10	¼	1 to 2 ozs.
Senegæ ...	Senega root powdered 1 oz.,and boiling water 1 pt.	1 in 20	½	½ to 1 oz.
Sennæ ...	Senna 2 ozs., ginger sliced 55 grs. boiling water 1 pt.	1 in 10	¼	½ to 1 oz.
Serpentariæ ..	Rhizome powdered 1 oz., boiling water 1 pt.	1 in 20	¼	½ to 1 oz.
Uvæ Ursi ...	Bearberry leaves bruised 1 oz.and boiling water 1 pt.	1 in 20	¼	½ to 1 oz

Injectiones Hypodermicæ. Hypodermic Injections are solutions of drugs for injection under the skin. They are 4 in number The vehicle for each should be boiled and cooled before the drug is dissolved in it. Inj. Apomor. Hyp. and Inj. Ergotæ, Hyp. are to be made fresh before use :—

Injectio Hypodermica.	Composition.	Strength.	Dose for subcuteneous injection.
Apomorphinæ	Hydrochloride of apomorphine 1 gr., diluted hydrochloric acid 1 m., water to 110 ms.	1 gr. in 110 ms.	5 to 10 ms.
Cocainæ ...	Cocaine hydrochloride 33 grs. salicylic acid ½ gr., water to 6 drs.	10 grs. in 110 ms.	2 to 5 ms.
Ergotæ ...	Extract of ergot 100 grs., phenol 3 grs., water to 330 ms.	33 grs. in 110 ms.	3 to 10 ms
Morphinæ ...	Morphine tartrate 50 grs. water *q. s.* to 1,100 ms.	5 grs. in 110 ms.	2 to 5 ms.

Lamellæ. **Eye-Discs** are thin plates or discs of drugs used in ophthalmic practice. These are prepared by dissolving transparent gelatin in glycerin and water, and are medicated and spread out. They are 4 in number :—

Lamellæ.	Composition.	Strength in each.	Action.
Atropinæ ...	Discs of gelatin with glycerin weighing about $\frac{1}{50}$ gr. each.	$\frac{1}{5000}$ gr.	Mydriatic.
Cocainæ ...	Discs of gelatin with glycerin, weighing about $\frac{1}{50}$ gr. each.	$\frac{1}{50}$ gr.	A local anæsthetic.
Homatropinæ	Discs of gelatin with some glycerin, weighing about $\frac{1}{50}$gr. each.	$\frac{1}{100}$ gr.	Mydriatic.
Physostigminæ	Discs of gelatin with glycerin weighing about $\frac{1}{50}$ gr. each.	$\frac{1}{1000}$ gr.	Myotic.

Each disc of Lamellæ Cocainæ is now 4 times the strength of a disc of cocaine of the B. P. 1885.

Linimenta. **Liniments** or **Embrocations** are preparations used for rubbing or painting over the skin. Majority of them are limpid liquids. Lint. Pot. Iodidi c. Sapone is a soft solid like a shaving cream. All of them contain either a fixed oil, a volatile oil, or a soap. Camphor enters into the composition of 11 of them, for its local stimulant action, and also to lessen the risk of their being swallowed on account of their having a strong smell. Lin. Aconiti and Lin. Belladonnæ are strong solutions of active principles in alcohol (90. p. c.) with camphor added. Lin. Iodi of the B. P. 1885 is now called Liquor Iodi Fortis, rectified spirit and glycerin being replaced by alcohol 90 p. c. and distilled water. The old Lin. Camphor. Co. is now wisely called Lin. Camphoræ Ammoniatum, to distinguish it from the ordinary Liniment of Camphor, which is a mixture of camphor and olive oil. The old Lin. Sinapis Co. is no longer called a compound Liniment of Mustard, but only Lin. Sinapis, from which ethereal extract of mezereon is removed. It must be remembered that Linimentum Terebinthinæ Aceticum should not be mixed with Linimentum ammoniæ, as by this admixture, the effects of both are lost by a chemical combination. They are 15 in number :—

Linimentum.	Preparation.	Strength.	Action and use.
Aconiti ...	Powdered root 20 ozs., camphor 1 oz., alcohol 90 p. c. to 30 ozs. ; by digestion and percolation.	1 in 1½	A powerful local sedative and anodyne. In neuralgia.

Linimentum.	Preparation.	Strength.	Action and use.
Ammoniæ ...	Solution of ammonia 1 oz., almond oil 1 oz. and olive oil 2 ozs.; by mixture.	1 in 4	A local stimulant and rubefacient.
Belladonnæ ...	Liquid extract 10 ozs., camphor 1 oz., water 2 ozs., and alcohol 90 p. c. to 20 ozs.; by maceration.	1 in 2	A powerful local anodyne. In neuralgia, &c.
Calcis ...	Lime water 2 ozs. and olive oil 2 ozs.; shaken together.	1 in 2	An emollient and sedative application to burns.
Camphoræ ...	Camphor in flowers 1 oz. and olive oil 4 ozs.; by maceration.	1 in 5	A local stimulant.
Camphoræ Ammoniatum ...	Camphor 2½ ozs., oil of lavender 1 dr., strong solution of ammonia, 5 ozs. and alcohol 90 p. c. to 20 ozs.; by maceration.	1 in 8	Rubefacient and counter-irritant.
Chloroformi ...	Chloroform 2 ozs and camphor liniment 2 ozs.; by mixture.	1 in 2	Rubefacient and anodyne.
Crotonis ...	Croton oil 1 oz., oil of cajuput 3½ ozs. and alcohol 90 p. c. 3½ ozs.; by mixture.	1 in. 8	Rubefacient, pustulant, and counter irritant.
Hydrargyri ...	Ointment of mercury 1 oz., strong solution of ammonia 160 ms. and liniment of camphor to 3 ozs.; by trituration and mixture.	1 of oint. in 3, or 1 of Hg. in 6.	Stimulant, absorbent. In chronic enlargements.
Opii ...	Tincture of opium 2 ozs. and liniment of soap 2 ozs.; by mixture.	1 in 2	Anodyne.
Potassii Iodidi Cum Sapone.	Curd soap recently prepared 2 ozs., potassium iodide 1½ ozs., glycerin 1 oz., oil of lemon 1 dr. and water 10 ozs.; by trituration.	54½ grs. in 1 fl. oz; or 1 in 10 by weight	Alterative and resolvent. Does not stain or irritate the skin.
Saponis ... (*sometimes called Opodeldoc.*)	Soft soap 2 ozs., camphor 1 oz., oil of rosemary 3 drs. alcohol 90 p. c. 16 ozs. and water 4 ozs.; by maceration and filtration.	1 in 12	A stimulant application to sprains and bruises.
Sinapis ...	Volatile oil of mustard 1½ drs., camphor 120 grs., castor oil 5 drs. and alcohol 90 p. c. 4 ozs.; by mixture.	1 in 27	Stimulant and rubefacient.

Linimentum.	Preparation.	Strength.	Action and use.
Terebinthinæ..	Soft soap 1½ oz., water 5 ozs. or *q.s.*, to 1 pt., camphor 1 oz., and oil of turpentine 13 ozs. ; by maceration and trituration.	13 in 20	Irritant and rubefacient.
Terebinthinæ Aceticum ...	Oil of turpentine 4 ozs., glacial acetic acid 1oz. and liniment of camphor 4 ozs. ; by mixture.	4 in 9	Powerfully rubefacient.

Liquores. Solutions are solutions of vegetable, animal, and inorganic substances in distilled water, either alone or with other solvents. Three preparations, such as, Liqr. Pancreatis, Liqr. Thyroidei and Liqr. Epispasticus are obtained from the animal kingdom. Liqr. Epispasticus is prepared with acetic ether. Most of the vegetable solutions are made with the aid of alcohol of various strengths. They are 53 in number :—

Liquor.	Preparation.	Strength.	Dose.
Acid. Chromici...	Chromic anhydride 1 oz , and water 3 ozs. ; by solution.	25 p. c. anhydrous acid.	Used externally.
Ammoniæ ...	Strong solution of ammonia 1 pt. and water 2 pts. ; by mixture.	1 in 3 or (10 p. c.)	Used externally.
Ammoniæ Fortis.	——	32·5 p. c. by weight.	Used externally.
Ammoniæ Acetatis ...	Ammonium carbonate 1 oz., acetic acid *q. s.* (to neutralise), and water to 1 pt. ; by solution.	6½ p c, (nearly)	2 to 6 drs.
Ammonii Citratis ...	Ammon carbonate 1¾ oz., citric acid 2½ ozs. (to neutralise), water to 1 pt.	16 p.c. (nearly)	2 to 6 drs.
Arsenicalis (*Fowler's solution*)	Arsenious anhydride in powder 87½ grs., Potas. carb. 87½ grs., compound tincture of lavender 5 drs. and water to 1 pt.	1 gr. in 110 ms.	2 to 8 ms.
Arsenici Hydrochloricus ...	Arsenious anhydride in powder 87½ grs., hydrochloric acid 2 drs. and water to 1 pt.	1 gr. in 110 ms.	2 to 8 ms.

Liquor.	Preparation.	Strength.	Dose.
Arsenii et Hydrargyri Iodidi	Arsenious iodide 87½ grs., mercuric iodide 87½ grs. and water to 1 pt.; by trituration and solution.	1 gr. in 110 ms.	5 to 20 ms.
Atropinæ Sulphatis	Atropine sulphate 17½grs., salicylic acid 2 grs. and water 4 ozs.; by solution.	1 gr. in 110 ms.	½ to 1 m.
Bismuthi et Ammonii Citratis (*Liqr. Bismuthi.*)	Bismuth oxynitrate 613 grs., potassium citrate 613 grs., potassium carbonate 175 grs., nitric acid 1 oz., solution of ammonia *q. s.* water to 1 pt.; by and solution filtration.	3 grs. of bismuth oxide in 1 dr.	½ to 1 dr.
Calcis ...	Calcium hydroxide 2 ozs. and water *q. s.* to 1 gal.	½ gr. in 1 oz.	1 to 4 ozs.
Calcis Chlorinatæ	Chlorinated lime 1 lb. and water 1 gal.; by mixture and filtration.	About 3 p.c. chlorine when fresh.	—
Calcis Saccharatus ...	Calcium hydroxide 1 oz., refined sugar in powder 2 ozs. and water 1 pt.; by mixture and decantation.	8 grs. in 1 oz. nearly.	20 to 60 ms.
Calumbæ Conc. ...	Calumba root powdered 10 ozs., alcohol 90 p. c. 4½ ozs. and water to 1 pt.; by maceration.	1 in 2	½ to 1 dr.
Caoutchouc ...	India-rubber 1 oz., benzol 10 ozs. and carbon bisulphide 10 ozs., by maceration.	1 in 20	Used externally
Chiratæ Conc. ...	Chiretta in powder 10 ozs., alcohol 20 p. c. 25 ozs. to 1 pt.; by percolation.	1 in 2	½ to 1 dr.
Cuspariæ Conc. ...	Cusparia bark in powder 10 ozs. and alcohol 20 p. c. 25 ozs ; by percolation	1 in 2	½ in 1 dr.
Epispasticus ... (*blistering liquid*)	Cantharides in powder 10 ozs., acetic ether *q. s.* to 1 pt.; by percolation.	1 in 2. It is twice the strength of B. P. 1885.	Used externally
Ethyl Nitritis ...	———	2½ to 3 p. c.	20 to 60 ms.
Ferri Acetatis ...	Solution of ferric sulphate 2½ ozs., solution of ammonia 4 ozs., or *q.s.*, glacial acetic acid (liquified) 1½ ozs. and water *q. s.* to 1 pt.; by solution &c.	10 p. c. almost	5 to 15 ms.

Liquor.	Composition.	Strength.	Dose.
Ferri Perchloridi	Strong solution of ferric chloride 5 ozs. and water to 1 pt.; by mixture.	1 in 4	5 to 15 ms.
Ferri Perchloridi Fortis	Iron 4 ozs., hydrochloric acid 20½ ozs., nitric acid 1½ ozs. and water *q. s.* to 17½ ozs.	22½ grs. of iron in 110 ms.	———
Ferri Pernitratis	Iron 1 oz., nitric acid 4½ ozs. and water *q. s.* to 30 ozs.; by solution and filtration.	3¼ grs. of iron in 110 ms.	5 to 15 ms.
Ferri Persulphatis ...	Ferrous sulphate 8 ozs., sulphuric acid 6 ozs., nitric acid 6 ozs. and water *q. s.* to 11 ozs.	36 p. c.	———
Hamamelidis ...	Fresh leaves 50 ozs., water 100 ozs. and alcohol 90 p. c. 10 ozs.; by maceration and distillation to one-half.	1 in 1	Used externally.
Hydrargyri Nitratis Acidus	Mercury 4 ozs., nitric acid 5 ozs., water 1½ ozs.; by solution by heat.	48 p. c.	Used externally.
Hydrargyri Perchloridi	Mercuric chloride 10 grs. and water 1 pt.; by solution.	$\frac{1}{16}$ gr. in 1 dr. or ½ gr. in 1 oz.	½ to 1 dr.
Hydrogenii Peroxidi	An aqueous solution of hydrogen peroxide.	10 of Oxygen in 1.	½ to 2 drs.
Iodi Fortis	Iodine 1¼ ozs., potassium iodide ¾ oz., water 1¼ ozs. and alcohol 90 p.c. 9 ozs.; by solution.	1 in 9	Used externally.
Krameriæ Conc..	Krameria root in powder 10 ozs., alcohol 20 p. c. 25 ozs.; by percolation.	1 in 2	½ to 1 dr.
Magnesii Carbonatis	Magnesium sulphate 2 ozs., sodium carbonate 2½ ozs., and water *q.s.* to 1 pt.	10 grs. in 1 oz. nearly	1 to 2 drs.
Morphinæ Acetatis	Morphine acetate 17½ grs., diluted acetic acid 38 ms., alcohol 90 p.c. 1 oz. and water *q. s.* to 4 ozs.; by solution.	1 gr. in 110 ms.	10 to 60 ms.
Morphinæ Hydro-Chloride	Morphine hydrochloride 17½ grs., diluted hydrocloric acid 38 ms., alcohol 90 p.c. 1 oz., and water *q. s.* to 4 ozs.	1 gr. in 110 ms.	10 to 60 ms.

Liquor.	Composition.	Strength.	Dose.
Morphinæ Tartratis ...	Morphine Tartrate 17½ grs., alcohol 90 p.c. 1 oz. and water *q. s.* to 4 ozs.	1 gr. in 110 ms.	10 to 60 m.
Pancreatis ...	A liquid preparation containing the digestive principles of fresh pancreas of the pig.	1 in 4 (nearly)	1 to 2 drs. (*unofficial*)
Picis Carbonis ...	Prepared coal tar 4 ozs., quillaia bark in powder 2 ozs. and alcohol 90 p. c. *q. s.* to 1 pt.; by percolation and digestion.	1 in 6	Used externally.
Plumbi Subacetatis Dil. (*Goulard's Lotion.*)	Strong lead subacetate solution 2 drs., alcohol 90% 2 drs., water *q. s.* to 1 pt.	1 in 80	Used externally.
Plumbi Subacetatis Fortis (*Goulard's Extract*)	Lead acetate 5 ozs., lead oxide in powder 3½ ozs. and water *q. s.* to 1 pt.; by boiling.	24 p. c.	Used externally.
Potassæ ...	An aqueous solution containing 27 grs. of potassuim hydroxide in 1 oz.	6¼ grs. in 110 ms.	10 to 30 m.
Potassii Permanganatis.	Potassuim permanganate 87½ grs. and water *q. s.* to 1 pt.; by solution.	1 gr. in 110 ms.	2 to 4 drs.
Quassiæ Conc. ...	Quassia wood powdered 2 ozs. and alcohol 20 p. c. *q. s.* to 1 pt.; by percolation.	1 in 10	½ to 1 dr.
Rhei Conc. ...	Rhubarb root powdered 10 ozs. and alcohol 20 p. c. *q. s.* to 1 pt.; by percolation.	1 in 2	½ to 1 dr.
Sarsæ Co. Conc. ...	Sarsaparilla cut and bruised 20 ozs.; sassafras root shavings 2 ozs., guaiacum wood shavings 2 ozs., dried liquorice root bruised 2 ozs., mezereon bark cut small 1 oz., alcohol 90 p. c. 4½ ozs. and water *q. s.* to 1 pt.; by infusion and decoction.	1 in 1	2 to 8 drs.
Senegæ Conc. ...	Senega root 10 ozs., a mixture of 2 parts of alcohol 20 p. c., and one part of alcohol 45 p. c. 55 ozs. or *q. s.* to 1 pt.; by percolation.	1 in 2	½ to 1 dr.

Liquor.	Composition.	Strength.	Dose.
Sennæ Conc. ...	Senna powder 20 ozs., tincture of ginger 2½ ozs. alcohol 90 p. c. 2 ozs. and water *q. s* to 1 pt.	1 in 1	½ to 1 dr.
SerpentariæConc.	Rhizome powdered 10 ozs. and alcohol 20 p. c. 25 ozs. or *q s.* ; by percolation.	1 in 2	½ to 2 drs.
odæ Chlorinatæ	Chlorinated lime 16 ozs., sodium carbonate 24 ozs. and water 1 gal ; by solution with trituration, and filtration.	2½ p. c. Cl.	10 to 20 ms.
odii Arsenatis..	Sodium Arsenate recently rendered anhydrous 17½ grs. and water *q. s.* to 4 ozs.; by solution.	1 in 110 ms.	2 to 8 ms.
Sodii Ethylatis..	Clean and bright sodium 22 grs. and absolute alcohol 1 oz. ; cautiously dissolved.	18 p. c. C_2H_5ONa.	Used externally
Strychninæ Hydrochloridi ...	Strychnine hydrochloride 17½ grs. alcohol 90 p. c. 1 oz. and water *q. s.* to 4 ozs.; by solution.	1 gr. in 110 ms.	2 to 8 ms.
Thyroidei ...	A liquid prepared from fresh and healthy thyroid gland of the sheep.	100 ms. = 1 gland.	5 to 15 ms.
Trinitrini ...	Trinitroglycerin of commerce 17½ grs., alcohol 90 p. c. *q. s.* to 4 ozs.	1 gr. in 110 ms.	½ to 2 ms.
Zinci Chloridi...	Granulated zinc 1 lb., hydrochloric acid 44 ozs. and water *q. s.* to 2 pt.	46 grs. in 1 dr.	Used externally

The following 11 are of the same strength, containing 1 grain in 110 minims :—

Liq. Arsenicalis.
„ Arsenici Hydroclor.
„ Arsenii et Hydrag. Iodidi.
„ Atropinæ Sulph.
„ Morphinæ Acetat.
„ Morphinæ Hydrochlor.
Liq. Morphinæ Tart.
„ Pot. Permanganatis.
„ Sodæ Arsenatis.
„ Strychninæ Hydrochlorid.
„ Trinitrini.

Concentrated Liquors are newly introduced into the B. P. 1898. Diluted with water, they may be prescribed in place of the corresponding official infusions or decoctions. The concentrated

Liquors only differ in minor points from freshly prepared decoctions or infusions, and contain a small quantity of ethylic alcohol. They are 10 in number, *viz.*,—the concentrated solutions of Calumba, Cheretta, Cusparia, Krameria, Quassia, Rhubarb, Sarsaparilla, Senega, Senna and Serpentary. Liq. Sarsæ Comp. Conc. is a substitute for the old preparation of Decoct. Sarsæ Comp.

Lotiones. Lotions are solutions or mixtures of active ingredients for washing or for external application. They are only 2 in number :—

Lotio.	Composition.	Strength.	Action and use.
Hydrarg. Flava. (*Yellow Wash*)	Mercuric chloride 20 grs. and solution of lime 10 ozs.; by mixture.	2 grs. in 1 oz. (Mercuric oxide precipitates)	A stimulating application to syphilitic sores, especially where black wash is not sufficiently powerful.
Hydrarg. Nigra. (*Black Wash*)	Mercurous chloride 30 grs., glycerin ½ oz. mucilage of tragacanth 1¼ ozs. and solution of lime *q. s.* to 10 ozs. ; by trituration and mixture.	3 grs. in 1 oz.	A stimulating alterative application to syphilitic sores.

Mella. Mellita. Honeys are liquid preparations containing mostly honey as a vehicle. They are 4 in number.—

Mel Depuratum is the honey melted and strained through flannel.

Mel.	Preparation.	Strength.	Dose.	Action.
Boracis ...	Powdered borax 1 oz., clarified honey 8 ozs. and glycerin ½ oz.; by mixture.	1 in 9½	Used locally.	An alterative to diseased mucous surface.
Oxymel ...	Clarified honey liquefied 40 ozs., acetic acid 5 ozs. and water *q. s.* or about 5 ozs. ; by mixture.	4 in 5	1 to 2 drs	Expectorant. Used as a vehicle.
Oxymel Scillæ	Squill bruised 2½ ozs., acetic acid 2½ ozs., water 8 ozs. ; digest for 7 days and to the product add clarified honey *q. s.* or 27 ozs. to produce a sp. gr. 1·320.	...	½ to 1 dr.	Expectorant.

Misturæ. Mixtures are preparations in which drugs are simply dissolved in water or suspended in it. The insoluble substances are usually suspended with the help of gum, syrup, yolk of egg, &c. The official mixtures are only 9 in number, the ingredients of which are mostly suspended. Mist. Sennæ Co. is an official substitute for "Black Draught." The egg-flip or the brandy mixture is prepared with the yolk of egg. The dose is the same for all—½ to 1 or 2 ozs.

Mistura.	Preparation.	Strength per oz.	Dose.	Action.
Ammoniaci	Powdered ammoniacum ¼ oz., syrup of tolu 4 drs. and water 7½ ozs. ; by trituration and straining.	13½ grs.	½ to 1 oz.	Stimulating expectorant.
Amygdalæ...	Compound powder of almonds 2 ozs., water 16 ozs. ; by trituration and straining.	54 grs.	½ to 1 oz.	Used as a vehicle.
Creasoti ...	Creasote 16 ms., spirit of juniper 16 ms., syrup 1 oz. and water *q. s.* to 16 ozs.; by shaking.	1 m.	½ to 1 oz.	Sedative, astringent and antiseptic.
Cretæ ...	Prepared chalk ¼ oz., tragacanth in powder 15 grs., refined sugar ½ oz. and cinnamon water to 8 ozs. ; by trituration.	13½ grs.	½ to 1 oz.	Antacid and astringent.
Ferri Co. ... (*Griffith's Mixture.*)	Ferrous sulphate 25 grs., potassium carbonate 30 grs., myrrh 60 grs., refined sugar 60 grs., spirit of nutmeg 50 ms. and rose water *q.s.* to 10 ozs.; by trituration and solution.	2½ grs.	½ to 1 oz.	Hæmatinic and emmenagogue.
Guaiaci ...	Guaiacum resin ½ oz., refined sugar ½ oz., powdered tragacanth 35 grs. and cinnamon water 1 pt.; by trituration.	11 grs.	½ to 1 oz.	Stimulant, alterative and diaphoretic.
Olei Ricini...	Castor oil 3 ozs., mucilage of gum acacia 1½ ozs., undiluted commercial orange flower water 1 oz. and cinnamon water 2½ ozs. ; by trituration.	3 drs.	1 to 2 ozs. as a draught.	Cathartic.

Mistura.	Preparation.	Strength per oz.	Dose.	Action.
Sennæ Co. ... (*Black Draught.*)	Magnesium sulphate 5 ozs., liquid extract of liquorice 1 oz., tinc. card. co. 2 ozs., spt. ammon. aromat. 1 oz. and inf. sennæ *q. s.* to 1 pt.; by solution.	¼ oz. Mag. Sulph.	1 to 2 ozs as a draught.	Hydragogue cathartic.
Spt. Vini Gallici (*Egg-flip.*)	Brandy 4 ozs., cinnamon water 4 ozs., refined sugar ½ oz. and yolks of 2 eggs.; by trituration.	3 drs.	1 to 2 ozs. as a draught.	Nutritive, restorative and stimulant.

Mucilagines. Mucilages are solutions of gummy substances in water. They are 2 in number, *viz* :—

Mucilago Acaciæ is prepared by dissolving gum acacia 4 ozs. in distilled water 6 ozs. after rinsing.

Mucilago Tragacanthæ is prepared by dissolving powered tragacanth 60 grs. in alcohol 90 p. c. 2 drs. and distilled water to make 10 ozs.

Mucilages are used more as vehicles or excipients with a view to assist suspension of insoluble powders in a mixture, or in pill-making and pill-coating, than for therapuetical purposes.

Oleata. Oleates are preparations of bases with oleic acid, having a solid or semi-solid consistence. Only one preparation is in the B. P. *Viz* :—

Hydrargyri oleas.—Mercuric chloride 1 oz, powdered hard soap 2 ozs, oleic acid 1 dr. and boiling distilled water *q. s.*

Olea. Oils.—There are 33 oils in the B. P. They can be grouped under two classes—*fixed* and *volatile*. The former being obtained by expression, and the latter by distillation except in the case of Lemon oil, which is a volatile oil obtained by expression.

Of the 8 fixed oils, Codliver oil is an animal product, being extracted by heat not exceeding 180° F, and the rest are expressed at ordinary temperatures. Ol. Theobrom. is solid in cold weather and semi-solid or fluid in hot weather. The colour of Cajuput is deep-green and that of Cade is almost black. The color of the rest varies from a colorlessness to straw, pale-brown and yellow. The doses of Croton oil and Phosphorated oil are ½ to 1 m. and 1 to 5 ms. respectively ; while the remaining ones can be given in large doses.

FIXED OR EXPRESSED OILS.

Oleum.	Source.	Dose.	Action.
Amygdalæ ...	Bitter or sweet almonds.	Used externally.	Demulcent and emollient.
Crotonis ...	Seeds.	½ to 1 m.	Hydragogue purgative.
Lini ...	Linseed.	Used externally.	Demulcent, emollient.
Morrhuæ ...	Fresh liver; extracted by heat under 180° F.	1 to 4 drs.	Nutritive, tonic and alterative.
Olivæ ...	Ripe fruit.	2 dr. to 1 oz.	Laxative.
Phosphoratum	Oil of almonds and phosphorus.	1 to 5 ms.	Tonic and alterative.
Ricini ...	Fresh seeds.	1 to 8 drs.	Cathartic.
Theobromatis	Crushed seeds; expressed by heat.	Used externally.	For making all suppositories except that of Glycerin.

VOLATILE OR DISTILLED OILS.

Oleum.	Source.	Dose.	Action.
Anethi ...	Dill fruit.	½ to 3 ms.	Antispasmodic and carminative.
Anisi ...	Anise or star-anise fruits.	½ to 3 ms.	Do.
Anthemedis ...	Chamomile flowers.	½ to 3 ms.	Aromatic, stimulant.
Cadinum ... (*Juniper Tar Oil*)	Woody portions; by destructive distillation.	Used externally.	A stimulating application to scaly cutaneous diseases.
Cajuputi ...	Leaves.	½ to 3 ms.	A diffusible stimulant and antispasmodic.
Carui ...	Caraway fruit.	½ to 3 ms.	Carminative, antispasmodic.
Caryophylli ...	Cloves.	½ to 3 ms.	Do
Cinnamomi ...	Cinnamon bark.	½ to 3 ms.	Carminative, stomachic.
Copaibæ ...	Copaiba.	5 to 20 ms.	A stimulant to urinary and other mucous membranes.
Coriandri ...	Coriander fruit.	½ to 3 ms.	Antispasmodic, carminative.
Cubebæ ...	Cubebs	5 to 20 ms.	Diuretic, expectorant.

Oleum.	Source.	Dose.	Action.
Eucalypti ...	Fresh leaves.	½ to 3 ms.	Antiseptic.
Juniperi ...	Unripe green fruit.	½ to 3 ms.	Stimulant, diuretic.
Lavandulæ ...	Flowers.	½ to 3 ms.	Carminative, antispasmodic.
Limonis ...	Fresh lemon peel.	½ to 3 ms.	Aromatic.
Menthæ Piperitæ ...	Fresh flowering plant.	½ to 3 ms.	Antispasmodic and carminative.
Menthæ Virides ...	Fresh flowering plant.	½ to 3 ms.	Do.
Myristicæ ...	Dried seeds.	½ to 3 ms.	Carminative and narcotic.
Pimentæ ...	Unripe fruits.	½ to 3 ms.	Stimulant, carmitive.
Pini ...	Fresh leaves.	Used externally.	Rubefacient and astringent.
Rosæ ... (*Otto of Rose*)	Fresh flowers.	——	Powerfully fragrant.
Rosmarini ...	Flowering tops,	(½) to 3 ms.	Rubefacient and stimulant.
Santali ...	Wood of *Santalum album.*	5 to 30 ms.	Diuretic and stimulant like copaiba.
Sinapis Volatile	Black mustard seeds	——	Vesicant.
Terebinthinæ	From oleo-resin by aid of steam.	2 to 10 ms. As an anthelmintic 3 to 4 drs.	Rubefacient, diuretic, anthelmintic and cathartic.

The oils of Cloves, Cinnamon, Pimento and Mustard *sink* in water. The dose of most of the volatile oils is from ½ to 3 minims, with the exception of Copaiba, Cubebs, Sandal Wood and Turpentine. The oil of Mustard, as now ordered in the new B. P., is a volatile oil and is a powerfully irritant poison, and is only used externally in the shape of Lint. Sinapis. Volatile oils are combined with many B. P. pills either to correct their griping, or to serve as a means of distinction from various pill-masses.

Pilula. Pills are solid or semisolid globular masses containing medicinal agents intended to be swallowed whole without chewing. The pills are always popular for easy administration, being portable, easily swallowed and containing a definite and correct formula. They should not be too hard unless intended to dissolve slowly, or so soft as to lose shape and stick together. To prevent this and to cover the nauseous taste they are coated or gilded. In India and tropical countries, pills get too hard or too soft according to the variations of the weather, being liable to become soft and to run together during the rains. To avoid this, they should be kept in well stoppered bottles. Pills as a rule should not weigh more than 5 grains each. A mass of the consistence of firm clay is first made by pounding and kneading the medicines together in a mortar ; and subsequently this mass is either rolled and divided by a pill-making machine, or when the quantity is small, the same process is done over a pill-tile by the spatula. The pills should be perfectly round and firm. An excipient is always necessary to make a pill-mass.

The B. P. pills are 20 in number. They are :—

Pilula.	Composition.	Strength.	Dose.	Action.
Aloes Barb.	Barbados aloes 2 ozs. hard soap 1 oz., oil of caraway 1 dr. and confection of roses 1 oz. or *q. s.*	1 in 2.	4 to 8 grs.	Cathartic.
Aloes et ... asafetidæ	Socotrine aloes 1 oz., asafetida 1 oz., hard soap 1 oz. and confection of roses 1 oz. or *q.s.*	1 in 4.	4 to 8 grs.	Cathartic and antispasmodic.
Aloes et ... Ferri	Exsiccated ferrous sulphate 1 oz., Barbados aloes 2 ozs., compound powder of cinnamon 3 ozs., syrup of glucose 3 ozs. or *q.s.*	2 & 1 in 9.	4 to 8 grs.	Cathartic and emmenagogue.
Aloes et ... Myrrhæ	Socotrine aloes 2 ozs., myrrh 1 oz., syrup of glucose 1½ oz. or *q.s.*	2 & 1 in 4½.	4 to 8 grs.	Do.
Aloes Soc.	Aloes Soc. 2 ozs. hard soap 1 oz., oil of nutmeg 1 dr. and conf. of roses 1 oz. or *q. s.*	1 in 2.	4 to 8 grs.	Cathartic.
Cambogiæ Co.	Gamboge 1 oz., Barbados aloes 1 oz., pulv. cinnamon co. 1 oz., hard soap 2 ozs. and syrup of glucose 1 oz. or *q.s.*	1 in 6.		Hydragogue purgative.
Colocynth. Co.	Colocynth pulp 1 oz., Barbados aloes 2 ozs, scammony resin 2 ozs, pot. sulph. ¼ oz., oil of cloves 2 drs. and water *q. s.*	1 in 6.	4 to 8 grs.	Cathartic.

Pilula.	Composition.	Strength.	Dose.	Action.
Colocynth. et Hyos.	Pil. colocynth. co. 2 ozs. and extract of hyoscyam. 1 oz.	2 & 1 in 3	4 to 8 grs.	Cathartic
Ferri ... (substitute for *Blaud's Pill*)	Exsiccated ferrous sulphate 150 grs., exsiccated sodium carbonate 95 grs., gum acacia 50 grs., tragacanth 15 grs., syrup 150 grs., glycerin 10 grs. and water 20 grs. or *q. s.*	1 in 5 (Ferrous Carb.)	5 to 15 grs.	Tonic and emmenagogue.
Galbani Co.	Asafetida 2 ozs., galbanum 2 ozs., myrrh 2 ozs. and syrup of glucose 1 oz. or *q. s.*	1 in 3½	4 to 8 grs.	Antispasmodic in hysteria.
Hydrargyri (*Blue Pill.*)	Mercury 2 ozs., confection of roses 3 ozs., liquorice root powdered 1 oz.,	1 in 3	4 to 8 grs.	Alterative and laxative.
Hydrargyri subchlor. Co. (*Plummer's Pill.*)	Mercurous chloride 1 oz. sulphurated antimony 1 oz., guaiacum resin 2 ozs., castor oil 180 grs. and alcohol 90 p.c. 1 dr. or *q. s.*	1 in 4½	4 to 8 grs.	Alterative and a feeble cathartic.
Ipecacuanhæ c. Scilla.	Compound powder of ipecac. 3 ozs., squill 1 oz., ammoniacum 1 oz., syrup of glucose *q. s.*	1 in 20	4 to 8 grs.	Expectorant and narcotic.
Phosphori	Phosphorus 10 grs., white wax 125 grs., lard 125 grs., kaolin 115 grs., and carbon bisulphide 33 ms., or *q.s.*	1 in 50.	1 to 2 grs.	Tonic and restorative.
Plumbi c... Opio.	Lead acetate 36 grs., opium 6 grs., syrup of glucose 4 grs. or *q.s.*	6 & 1 in 8.	2 to 4 grs.	Astringent and narcotic.
Quininæ ... Sulph.	Quinine sulphate 30 grs., tartaric acid 1 gr., glycerin 4 grs., tragacanth 1 gr.	5 in 6	2 to 8 grs.	Tonic and antiperiodic.
Rhei Co. ...	Rhubarb root 3 ozs., Socotrine aloes 2¼ ozs., myrrh 1½ ozs., hard soap 1½ ozs., oil of peppermint 1½ drs., syrup of glucose 2¾ ozs. or *q.s.*	1 in 3⅔	4 to 8 grs.	Stomachic, tonic and a gentle cathartic.
Saponis Co.	Opium ½ oz., hard soap 1½ ozs., syrup of glucose ½ oz.	1 in 5 (of opium.)	2 to 4 grs.	Astringent, narcotic ; like opium.

Pilula.	Composition.	Strength.	Dose.	Action.
Scammonii Co.	Scammony resin 1 oz., jalap resin 1 oz., curd soap 1 oz., tincture of ginger 3 ozs.	1 in 3¼	4 to 8 grs.	Cathartic.
Scillæ Co.	Squill 1¼ ozs., ginger 1 oz., ammoniacum 1 oz., hard soap 1 oz and syrup of glucose 1 oz. or *q.s.*	1 in 4⅕	4 to 8 grs.	Expectorant and diuretic.

All cathartic pills in the above table contain Aloes except the Mercurial pills and Pil. Scammonii Co. All pills are given in 4 to 8 grain doses, except Pil. Phosph., Pil. Plumb. C. Opio., Pil. Sapon. Co. and Pil. Ferri (which see).

The Color of the B. P. pill-masses is blackish-brown or black, with the exception of Pil. Quin. Sulph. which is white; Pil. Hydrarg., which is blue; and Pil. Hyd. Subchlor. Co., which is orange-red. Camboge pill is not yellow though the drug itself is. Many of the pills can be diagnosed by odors, as for instance, Pil. Rhei Co. by the smell of peppermint; Pil. Saponis of opium; and Pil. Aloes et Asafetida of asafetida.

The student should familiarize himself with the colors and odors of the above preparations.

Pulveres. Powders are mixtures of dry substances reduced to a fine powder and intimately mixed together. The powders should be mixed in a very clean mortar (a glass one being the best). The method of mixing greatly affects the miscibility of powders. It is the practice of many mothers to administer powders to their children mixed with jam, but it should be borne in mind that the acid present in the jam would combine with and alter the action of alkalis if present. The best and simplest method is to give them mixed with sugar and water, or milk, in a small draught.

The B. P. powders are 16 in number and they are as under :—

Pulvis.	Composition.	Strength.	Dose in grains.	Action.
Amygdalæ ... Co.	Sweet almonds 8 ozs., sugar refined 4 ozs., and powdered gum acacia 1 oz.	8 in 13	———	Demulcent, nutritive.
Antimonialis (Substitute for *James's Powder*)	Antimonious oxide 1 oz. and calcium phosphate 2 ozs.	1 in 3	3 to 6	Diaphoretic, emetic in large doses.

Pulvis.	Composition.	Strength	Dose in grains.	Action.
Catechu Co. ...	Catechu 4 ozs., kino 2 ozs., krameria root 2 ozs., cinnamon bark 1 oz. and nutmeg 1 oz.	1 in 2½	10 to 40	Aromatic, and astringent.
Cinnamomi Co. ...	Cinnamon bark 1 oz., cardamom seeds 1 oz. and ginger 1 oz.	1 in 3	10 to 40	Aromatic, carminative.
Cretæ Aromat. ...	Cinnamon bark 4 ozs., nutmeg 3 ozs., cloves 1½ ozs., cardamom seeds 1 oz., refined sugar 25 ozs. and prepared chalk 11 ozs.	1 in 4	10 to 60	Aromatic, astringent, and antacid.
Cretæ Aromat. cum Opio.	Aromatic chalk powder 9¾ ozs. and opium ¼ oz.	1 in 40 (opium)	10 to 40	Aromatic, astringent and narcotic.
Elaterini Co. ...	Elaterin 5 grs. and milk-sugar 195 grs.	1 in 40	1 to 4	Hydragogue purgative.
Glycyrrhizæ Co.	Senna 2 ozs., liquorice root 2 ozs., fennel fruit 1 oz., sublimed sulphur 1 oz. and sugar 6 ozs.	1 in 6	60 to 120	A mild cathartic.
Ipecac. Co. (*Dover's Powder*)	Ipecac root ½ oz., opium powder ½ oz. and potassium sulphate 4 ozs.	1 in 10	5 to 15	Diaphoretic, anodyne.
Jalapæ Co. .	Jalap 5 ozs., acid potassium tartrate 9 ozs. and ginger 1 oz.	1 in 3	20 to 60	Hydragogue purgative.
Kino Co. ...	Kino 3¾ ozs., opium ¼ oz. and cinnamon bark 1 oz.	1 in 20 (opium)	5 to 20	Astringent, anodyne and narcotic.
Opii Co. ...	Opium powder 1½ ozs., black pepper 2 ozs., ginger 5 ozs., caraway 6 ozs., tragacanth ½ oz.	1 in 10	2 to 10	Carminative and narcotic
Rhei Co. ... (*Gregory's Powder*)	Rhubarb root 2 ozs., light magnesia 6 ozs. and ginger 1 oz.	1 in 4½	20 to 60	Antacid, stomachic and cathartic.
Scammony Co. ...	Scammony resin 4 ozs., jalap 3 ozs. and ginger 1 oz.	2 in 2	10 to 20	Hydragogue purgative.
Sodæ Tart. Efferves. (*Seidlitz Powder*)	Tartarated soda 120 grs., sodium bicarbonate 40 grs., mix, and wrap in blue paper; tartaric acid in dry powder 38 grs., wrap in white paper.	120, 40 and 38	198	Hydragogue cathartic.
Tragacanth Co. ...	Tragacanth 1 oz., gum acacia 1 oz., starch 1 oz. and sugar 3 ozs.	1 in 6	20 to 60	Demulcent.

Except Antimonialis, Cretæ Aromat. Cretæ Aromat. c. Opio and Sodæ Tart. Effervescens, all powders are called "Compound." In fact, all of them are compound having more than one ingredient. Generally, they can be distinguished by their colors and smells, with a little care and trouble.

Spiritus. Spirits.—A spirit, as ordinarily understood, is a distilled product obtained from fermented vinous liquors. But the B. P. Spirits are alcoholic solutions of volatile oils and ethers, with the exception of rectified spirit. They can be divided into two classes—**simple** and **compound.** The simple Spirits are solutions of essential oils, ethers and chloroform in alcohol 90 p. c., which often get turbid when diluted with water. The compound Spirits contain more than one ingredient, and are prepared by distillation. The B. P. Spirits are 18 in number, of which 12 are simple and the rest compound.

SIMPLE SPIRITS.

Spiritus.	Composition.	Strength	Dose.	Action.
Ætheris ...	Ether 10 ozs. and alcohol 90 p. c. 1 pt.	1 in 3	20 to 40 m. or 60 to 90 m	A diffusible stimulant, antispasmodic and carminative.
Anisi ...	Oil of anise 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	5 to 20 m.	Carminative and antispasmodic.
Cajupati ...	Oil of cajuput 1 oz. and alcohol 90 p.c. *q. s.* to 10 ozs.	1 in 10	5 to 20 m.	A diffusible stimulant and antispasmodic.
Camphor ...	Camphor 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	5 to 20 m.	Stimulant and antispasmodic.
Chloroformi (*Chloric Ether*)	Chloroform 1 oz. and alcohol 90 p. c. *q. s.* to 1 pt.	1 in 20	5 to 20 m. or 30 to 40 m.	A diffusible stimulant and antispasmodic.
Cinnamomi	Oil of cinnamon 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	5 to 20 m.	Carminative and stomachic.
Juniperi ...	Oil of juniper 1 oz. and alcohol 90 p. c. *q. s.* to 1 pt.	1 in 20	20 to 60 m.	A stimulating diuretic.
Lavandulæ	Oil of lavender 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	5 to 20 m.	Carminative and antispasmodic.
Menthæ pip.	Oil of peppermint 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	Do-	Carminative and antispasmadic.

Spiritus.	Composition.	Strength	Dose.	Action.
Myristicæ	Oil of nutmeg 1 oz. and alcohol 90 p. c. *q. s.* to 10 ozs.	1 in 10	Do.	Carminative.
Rectificatus	Alcohol with 10 p. c. of water.	90 p. c.	——	Same as alcohol.
Rosmarini...	Oil of rosemary 1 oz. and alcohol 90 pc. *q. s.* to 10 ozs.	1 in 10	——	A local and general stimulant.

COMPOUND SPIRITS.

Spiritus.	Composition.	Strength.	Dose.	Action.
Ætheris ... Co. (*Hoffmann's Anodyne*)	Ether 5½ ozs., alcohol 90 p.c. 78 ozs., sulphuric acid 36 ozs., distilled water 1½ ozs. and sodium bicarbonate *q.s.*	S. G. ·808 to ·812	20 to 40 m or 60 to 90 m.	A diffusible stimulant and anodyne.
Æther. Nitrosi (*Sweet Spirit of Nitre*)	Nitric acid 3 ozs., sulphuric acid 2 ozs., copper 2 ozs. and alcohol 90 p.c. *q. s.*	S. G. ·838 to ·842	20 to 40 m. or 60 to 90 m.	Diaphoretic, diuretic, stimulant, antispasmodic.
Ammoniæ aromat. (*Spirit of Sal Volatile*)	Carbonate of ammonia 4 ozs., strong solution of ammonia 8 ozs., oil of nutmeg 4½ drs., oil of lemon 6½ drs., alcohol 90 p.c. 6 pts. and distilled water 3 pts.	1 in 40 (carbonate) 1 in 20 (Liq. ammonia fort.)	20 to 40 m. or 60 to 90 m.	Cardiac stimulant, antispasmodic and carminative.
Ammoniæ Fetid.	Asafetida 1½ ozs., strong solution of ammonia 2 ozs., alcohol 90 p.c. *q.s.*	1½ in 20	Do.	Stimulant, and antispasmodic.
Armoraciæ Co.	Horseradish root 5 ozs., bitter-orange peel 5 ozs., nutmeg 55 grs., alcohol 90 p.c. 1¼ pts. and distilled water 1½ pts.	1 in 8	1 to 2 drs.	Stimulant, diuretic.
Vin. Gallici (*Brandy.*)	Spirit distilled from wine and matured by age.	43½% ethyl hydroxide	—	Same as alcohol.

Succi. Juices :—A prepared juice is expressed from a fresh plant, to which one-third of its volume of alcohol 90 p. c. is added for its preservation. It must be set aside for 7 days before filtration and use. Succus Limonis, properly speaking, cannot be called a preparation, and contains no alcohol. It is used for making lemon syrup. The B. P. juices are 6 in number :—

Succus.	Source.	Dose.	Action.
Belladonnæ	Fresh leaves and young branches.	5 to 15 ms.	Anodyne and sedative.
Conii ...	Fresh leaves and young branches.	1 to 2 drs.	Do.
Hyoscyami	Fresh leaves, flowering tops and young branches.	½ to 1 dr.	Do.
Limonis ...	Ripe fruit.	½ to 2 ozs. (*unofficial*)	Refrigerent and antiscorbutic.
Scoparii ...	Fresh broom tops.	1 to 2 drs.	Diuretic.
Taraxaci...	Fresh root.	1 to 2 drs.	Diuretic, feebly cholagogue and laxative.

Suppositoria. Suppositories are solid conical shaped masses containing some active ingredients, for introduction into the rectum. These are blended with cocoa butter or gelatin. They weigh about 15 grains each and are made in conical moulds of massive gun metal. They are 7 in number :—

Suppositoria.	Composition.	Strength in each.	Action.
Acidi ... **Carbolici**	Phenol 12 grs., bee's wax 24 grs., oil of theobroma *q.s.* for 12.	1 gr.	Antiseptic and a local anæsthetic.
Acidi ... **Tannici**	Tannic acid 36 grs., oil of theobroma *q.s.* for 12.	3 grs.	A local astringent and styptic.
Belladonnæ	Alcoholic extract of belladonna, 18 grs. and oil of theobroma *q.s.* for 12.	1½ gr. each or $\frac{1}{60}$ gr. (alkaloids.)	A local anodyne.
Glycerini	Gelatin ½ oz., glycerin 2½ ozs. and distilled water *q.s.*	70 per cent.	Introduced into the rectum in costiveness.
Iodoformi	Iodoform 36 grs. and oil of theobroma *q.s.* for 12.	3 grs.	A local antiseptic.
Morphinæ	Morphine hydrochloride 3 grs. and oil of theobroma *q.s.* for 12.	¼ gr.	A local anodyne.
Plumbi Co.	Lead acetate 36 grs., opium 12 grs. and oil of theobroma *q.s.* for 12.	3 grs. and 1 gr.	Anodyne and astringent.

Each Glycerin Suppository is made to weigh either 30, 60, or 120 grs. It opens the bowels by a reflex action. Suppositoria Plumbi Co. contains 1 grain of opium, though its name does not indicate it.

Suppositories are used either to produce a local action on the rectum, or on the adjacent pelvic organs, such as, the uterus and the bladder, or for general action on the body when we wish to avoid any local action on the stomach. Thus, Morphine suppository may be used for soothing pain and irritation of the rectum, the pelvic organs, or to induce sleep. The same can be said of the compound lead suppository.

Syrupi. Syrups are fluid preparations of drugs containing a sufficient quantity of refined sugar, either to preserve them or to make their administration more agreeable. In the case of Syr. Ferri Iodid. and Syr. Ferri Phosph. sugar prevents oxidation. They are 22 in number :—

Syrupus.	Composition.	Strength by volume.	Dose. in drachm.	Action.
Syrup ...	Refined sugar 5 lbs. and boiling water *q. s.* to 7½ lb.	1 in 1⅛	—	A sweetening agent.
Aromaticus	Tincture of orange 5 ozs., cinnamon water 5 ozs. and syrup 10 ozs.	—	½ to 1	A flavouring agent.
Aurantii ...	Syrup 7 ozs. and tincture of orange 1 oz.	1 in 8	½ to 1	A flavouring agent.
Aurantii ... **Floris**	Commercial orange flower water 8 ozs., sugar 3 lbs. and boiling water *q. s.* to 4½ lbs.	1 in 6¾	½ to 1	A flavouring agent.
Calcii Lactophosph.	Precipitated calcium carbonate 2½ ozs., concentrated phosphoric acid 4 ozs., and 262 ms., lactic acid 6 ozs., sugar 70 ozs., commercial orange flower water 2½ ozs. and water *q. s.* to 5 pts.	—	½ to 1	Nervine tonic.
Cascaræ ... **Aromaticu**	Liquid extract of cascara 8 ozs., tincture of orange 2 ozs., alcohol 90 p. c. 1 oz., cinnamon water 3 ozs. and syrup 6 ozs.	1 in 2½	½ to 2	Stomachic, tonic and laxative
Chloral ...	Chloral hydrate 1600 grs., water 30 drs. and syrup *q. s.* to pt.	1 in 6 or 10 grs. in 1 dr.	½ to 2	Hypnotic.

Syrupus.	Composition.	Strength by volume.	Dose in drachm.	Action.
Codeinæ ...	Codeine phosphate 40 grs., water ¼ oz. and syrup 19¾ ozs.	1 in 240 or ¼ gr. in 1dr.	½ to 2	Hypnotic.
Ferri Iodidi	Iron wire ½ oz., iodine 726 grs., sugar 16½ ozs. and water *q. s.* to pt.	1 in 11	½ to 1	Hæmatinic, tonic and alterative.
Ferri Phosphatis	Iron wire 75 grs., concentrated phosphoric acid 1¼ ozs., syrup 14 ozs. and water *q.s.* to 1 pt.	1 in 60 or 1 gr. of ferrous phosphate in 1 dr.	½ to 1	Hæmatinic, nervine tonic.
Ferri phosph c. Quin. et Strychnina (*Easton's Syrup.*)	Iron wire 75 grs., concentrated phosphoric acid 1¼ ozs., strychnine powder 5 grs., quinine sulphate 130 grs., syrup 14 ozs. and water *q. s.* to 1 pt.	1 gr. ferrous phosphate, ⅘ gr. of quin. sulph. and $\frac{1}{32}$ gr. of strychnine in 1 dr.	½ to 1	A general and nervine tonic.
Glucosi ...	Commercial liquid glucose 1 oz. and syrup 2 ozs.	1 in 3	——	An excipient for pills.
Hemidesmi	Hemidesmus root 4 ozs., sugar 28 ozs. and boiling water 1 pt.	1 in 8	½ to 1	Alterative. An adjuvant for cough mixtures.
Limonis ..	Sliced fresh lemon peel* 1 oz., alcohol 90 p. c. *q.s.*, lemon juice 25 ozs., and sugar 38 ozs.	1 in 2⅗	½ to 1	A flavouring agent.
Pruni Virginianæ	Virginian prune bark 3 ozs, sugar 15 ozs., glycerin 1¼ ozs. and water *q. s.* to 1 pt.	1 in 6⅔	½ to 1	Nervine sedative and a sweetening agent.
Rhei ...	Rhubarb root 2 ozs., coriander fruit 2 ozs., sugar 24 ozs., alcohol 90 p. c. 8 ozs. and water 24 ozs.	1 in 20	½ to 2	A mild laxative for children.
Rhœados ...	Red poppy petals 13 ozs., sugar 2¼ lbs., alcohol 90 p. c. 2½ ozs. and water *q. s.* to 3 lbs. 10 ozs.†	13 in 58	½ to 1	A colouring agent for mixtures.

---

* When fresh lemon peel cannot be obtained dried lemon peel can be used.

† In India and the colonies when prevailing high temperatures render this preparation liable to ferment, the proportion of alcohol (90 p. c.) may be increased but to not more than double the proportion stated in the Text of the Pharmacopæia, an equivalent quantity of distilled water being omitted.

Syrupus	Composition.	Strength by volume.	Dose in drachm.	Action.
Rosæ ...	Dried red-rose petals 2 ozs., sugar 30 ozs. and boiling water 1 pt.	1 in 23	½ to 1	A bright colouring agent.
Scillæ ...	Vinegar of squill 1 pt. and sugar 38 ozs.	1 pt. in 38 ozs.	½ to 1	Expectorant in ½ to 1 dr., and emetic in 1 oz.
Sennæ ...	Senna 40 ozs., oil of coriander 10 ms., alcohol 90 p.c. 40 ms., sugar 50 ozs. and alcohol 20 p. c. 70 ozs.	1 in 2	½ to 2	A mild cathartic.
Tolutanus	Balsam of tolu 1¼ ozs., sugar 2 lbs. and water *q. s.* to make 3 lbs. by weight.	1 in 29	½ to 1	A sweetening agent for cough mixtures.
Zingiberis	Ginger ½ oz., alcohol 90 p. c., syrup of each *q. s.* to produce 1 pt.	1 in 40	½ to 1	Carminative and antispasmodic.

Syrups can be recognized by their *colors*, *odors* and *taste*, with which the student should become familiar. The following table with reference to their colors is given below :—

Syr. Aurantii Flor.	Colorless.
,, Calcii Lactophosph.	
,, Chloral	
,, Codeinæ	
,, Ferri Iodidi	
,, ,, Phosph.	
,, Tolu	
,, Cascaræ Aromat.	Brown.
,, Hemidesmi	
,, Pruni Virginianæ.	
,, Rhei	
Syr. Sennæ ...	Dark-brown
,, Aurantii	Straw-colored.
,, Aromat.	
,, Limonis	
,, Scillæ	
,, Zingiberis	
,, Rhœados	Red.
,, Rosæ	

Syrup of ginger is somewhat cloudy.
Syrup Ferri Iodide is very liable to discoloration.

Tabellæ. Tablets.—According to the B. P., tablets are small flat pieces of chocolate containing minute doses of medicinal agents. Tablet-preparations are very popular now. According to their mode of preparation, they may be divided into 3 classes, *viz.* ;—(1) those made by compression ; (2) those made without compression but by moulding, commonly known as tablet-triturates ; and (3) those prepared from a chocolate basis, as ordered by the B P. The manufacture of compressed tablets has of late developed into a special industry in practical pharmacy and is done by special machinery.

There is only one tablet in the B. P. *viz*.:-

Tabellæ Trinitrini :—Made of chocolate, each weighing 5 grains and containing $\frac{1}{100}$ gr. of commercial trinitroglycerin. *Dose.*—1 or 2 tablets.

Tabellæ Hypodermicæ. Hypodermic tablets :—These contain a definite quantity of active ingredients easily soluble in water and are largely used by practitioners in preference to the B. P. hypodermic preparations. They are made with granular sodium sulphate or sugar of milk ; acetate of sodium being used for diluting morphine acetate.

The following is the list of hypodermic tablets with their doses, available in the market :—

Aconitine Nitrate—gr. $\frac{1}{260}$
Apomorphin. Hydrochlorid.—gr. $\frac{1}{15}$ and $\frac{1}{10}$.
Atropine Sulphate—gr. $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$.
Caffeine Sodio Salicylate—gr. $\frac{1}{2}$.
Cocaine Hydrochloride—gr. $\frac{1}{10}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$.
Codeine Phosphate—gr. $\frac{1}{4}$.
Cornutine Citrate—gr. $\frac{1}{60}$.
Curare—gr. $\frac{1}{12}$.
Digitalin—gr. $\frac{1}{100}$.
Ergotinine citrate—gr. $\frac{1}{200}$, $\frac{1}{100}$.
Ergotinine Citrate and Strych. Sulph.
  Ergotinine Citr. gr. $\frac{1}{100}$.
  Strych. Sulph. gr. $\frac{1}{20}$.
Eserine Salicylate—gr. $\frac{1}{100}$.
Eucaine Hydrochloride—gr. $\frac{1}{3}$, 1.
Homatropine Hydrochlor.—gr. $\frac{1}{250}$.
Hyoscine Hydrobromide—gr. $\frac{1}{200}$.
Hyoscyamine Sulphate—gr. $\frac{1}{80}$, $\frac{1}{20}$.
Mercury Perchloride—gr. $\frac{1}{60}$, $\frac{1}{30}$.
Morphine Bimeconate gr. $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$.
Morphine Hydrochloride—gr. $\frac{1}{6}$, $\frac{1}{4}$.
Morphine Hyd. and Atropine Sulph.
  Morphine Hyd.—gr. $\frac{1}{6}$.
  Atropine Sulph.—gr. $\frac{1}{70}$.
Morphine Sulph.—gr. $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, 1. and several strengths of morphine sulph. with atropine sulph.
Nitroglycerin (Trinitrin)—gr. $\frac{1}{250}$.
Pilocarpine Nitrate—gr. $\frac{1}{10}$, $\frac{1}{3}$, $\frac{1}{2}$.
Potassium Permanganate—gr. 2.
Quinine Acid Hydrocloride—gr. 1, 3.
Quinine Hydrobromide—gr. $\frac{1}{2}$.
Sparteine Sulphate—gr. $\frac{1}{2}$.
Strophanthin—gr. $\frac{1}{500}$.
Strychnine Nitrate—gr. $\frac{1}{15}$, $\frac{1}{10}$.
  ,, Sulphate—gr. $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{30}$.
Stypticin—gr. $\frac{1}{4}$.

Tincturæ. Tinctures are solutions of active ingredients in alcohol, differing from Spirits in their mode of preparation. They are 67 in nnmber, being drawn from the vegetable, animal and inorganic kingdoms. 63 are of vegetable origin, 2 being animal products, and 2 are prepared from inorganic substances. 10 Tinctures are made by plain solution, 28 by maceration and 29 by percolation.

Alcohol of various strengths is used to make 65 tinctures, such as, alcohol 90 p.c. in 20, alcohol 70 p.c. in 14, alcohol 60 p.c. in 21, alcohol 45 p.c. in 10 ; whilst water in addition is put in 6 The resulting tincture should measure one pint in all, except Belladonna (30 ozs.) and Nux Vom. (12 ozs.).

1 Tincture is made with ether ; *e. g.*, Tr. Lobel. Ether, and 1 with tincture of orange-peel, *e. g.*, Tr. Quininæ,

49 Tinctures are "*simple*," having only one ingredient and one

solvent. 9 Tinctures are called "*Compound*," having more than one ingredient. Another group of 9 Tinctures are not named compound in the B. P., though they contain more than one ingredient and a solvent. They are therefore named "*Complex*."

We shall group the Tinctures under three heads, viz.,—(1) **Simple**, (2) **Compound** and (3) **Complex**.

SIMPLE TINCTURES.

Tinctura.	Ingredient.	Degree of comminution.	Alcohol p. c. in menstruum.	Proces.	Strength.	Dose.
Aconiti ...	Root 1 oz.	40	70	P.	1 in 20	5 to 15 m. or 2 to 5 m.
Arnicæ ...	Rhizome 1 oz.	40	70	P.	1 in 20	—
Asafetidæ ...	Gum-resin 4 ozs.	—	70	M.	1 in 5	½ to 1 dr.
Aurantii ...	Fresh peel 5 ozs.	—	90	M.	1 in 4	½ to 1 dr.
Belladonnæ	Liquid extract 2 ozs. (standardised)	—	60	S.	$\frac{1}{20}$ gr. alkaloids in 110 m.	5 to 15 m.
Buchu ...	Leaves 4 ozs.	20	60	P.	1 in 5	½ to 1 dr.
Calumbæ ...	Root 2 ozs.	20	60	M.	1 in 10	½ to 1 dr.
Cannab. Ind.	Extract 1 oz.	—	90	S.	1 in 20	5 to 15 m.
Cantharidis	Cantharides ¼ oz	40	90	M.	1 in 80	5 to 15 m. or 2 to 5 m.
Capsici ...	Fruit 1 oz.	20	70	M.	1 in 20	5 to 15 m.
Cascarillæ ...	Bark 4 ozs.	40	70	P.	1 in 5	½ to 1 dr.
Chiratæ ...	Chiretta 2 ozs.	40	60	P.	1 in 10	½ to 1 dr.
Cimicifugæ ...	Rhizome 2 ozs.	40	60	P.	1 in 10	½ to 1 dr.
Cinchonæ ...	Red bark 4 ozs. (standardised)	40	70	P.	1 gr. alkaloids in 110 m.	½ to 1 dr.
Cinnamomi ...	Bark 4 ozs.	40	70	P.	1 in 5	½ to 1 dr.
Cocci ...	Cochineal 2 ozs.	—	45	M.	1 in 10	5 to 15 m.
Colchici Sem.	Seeds 4 ozs.	30	45	P.	1 in 5	5 to 15 m.
Conii ...	Fruit 4 ozs.	40	70	P.	1 in 5	½ to 1 dr.
Croci ...	Saffron 1 oz.	—	60	M.	1 in 20	5 to 15 m.
Cubebæ ...	Cubebs 4 ozs.	—	90	P.	1 in 5	½ to 1 dr.
Digitalis ...	Leaves 2½ ozs.	20	60	P.	1 in 8	5 to 15 m.
Ferri Perchlor	Strong solution 5 ozs., alcohol 5 ozs. and water *q. s.*		90	S.	1 in 4	5 to 15 m.

Note.—M = Maceration. P = Percolation. S = Solution.

Tinctura.	Ingredient.	Degree of comminution.	Alcohol p. c. in menstruum.	Process.	Strength.	Dose.
Gelsemii ...	Root 2 ozs.	40	60	P.	1 in 10	5 to 15 m.
Hamamelidis	Bark 2 ozs.	20	45	P.	1 in 10	½ to 1 dr.
Hydrastis ...	Rhizome 2 ozs.	60	60	P.	1 in 10	½ to 1 dr.
Hyoscyami ...	Leaves & flowering tops 2 ozs.	20	45	P.	1 in 10	½ to 1 dr.
Jaborandi ...	Leaves 4 ozs.	40	45	P.	1 in 5	½ to 1 dr.
Jalapæ ...	Jalap 4 ozs. (standardised).	40	70	P.	1½ gr. resin in 110 m.	½ to 1 dr.
Krameriæ ...	Root 4 ozs.	40	60	P.	1 in 5	½ to 1 dr.
Limonis ...	Fresh peel 5 ozs.	—	90	M.	1 in 4	½ to 1 dr.
Lobeliæ Æther	Lobelia 4 ozs., Spirit of ether (stronger than B. P. 1885).	40	Spt. ether.	P.	1 in 5	5 to 15 m.
Lupuli ...	Hops 4 ozs.	—	60	M.	1 in 5	½ to 1 dr.
Myrrhæ ...	Myrrh 4 ozs.	—	90	M.	1 in 5	½ to 1 dr.
Nuc. Vomicæ	Liquid extract 2 ozs., water 3 ozs.	—	90	S.	¼ gr. Strychnine in 110 m.	5 to 15 m.
Opii ... (*Laudanum*)	Opium 3 ozs. water *q. s.*	—	90	M.	¾ gr Morphine in 110 m.	5 to 15 m. or 20 to 30 m.
Podophylli ...	Resin 320 grs.	—	90	M.	3⅔ gr. in 110 m.	5 to 15 m.
Pruni Virg. ...	Bark 4 ozs., water 7½ ozs.	20	90	M.	1 in 5	½ to 1 dr.
Pyrethi ...	Root 4 ozs.	40	70	P.	1 in 5	Not taken.
Quassiæ ...	Chips 2 ozs.	—	45	M.	1 in 10	½ to 1 dr.
Quillaiæ ...	Bark 1 oz.	20	60	P.	1 in 20	½ to 1 dr.
Quininæ ...	Quinine Hydrochloride 175 grs.	—	Tr. aurantii.	S.	2 gr. in 110 m.	½ to 1 dr.
Scillæ ...	Squill 4 ozs.	—	60	M.	1 in 5	5 to 15 m.
Senegæ ...	Root 4 ozs.	40	60	P.	1 in 5	½ to 1 dr.
Serpentariæ	Rhizome 4 ozs.	40	70	P.	1 in 5	½ to 1 dr.
Stramonii ...	Leaves 4 ozs.	20	45	P.	1 in 5	5 to 15 m.
Strophanthi	Seeds ½ oz.	30	70	P.	1 in 40	5 to 15 m.
Sumbul ...	Root 2 ozs.	—	70	M.	1 in 10	½ to 1 dr.
Tolutana ...	Balsam 2 ozs.	—	90	M.	1 in 10	⅓ to 1 dr.
Zingiberis ...	Rhizome 2 ozs.	40	90	P.	1 in 10	⅓ to 1 dr.

Note :—M = maceration. P = percolation. S = solution.

COMPOUND TINCTURES.

Tinctura.	Ingredients.	Alcohol p. c. in menstruum.	Process.	Strength.	Dose.
Benzoini Co. (*Friar's Balsam*)	Benzoin 2 ozs., storax 1½ ozs., tolu ½ oz., Socotrine aloes 160 grs.	90	M.	1 in 10	½ to 1 dr.
Camphoræ Co. (*Paregoric*)	Tincture of opium 585 ms., benzoic acid 40 grs, camphor 30 grs., oil of anise 30 ms.	60	S.	¼ gr. opium in 1 dr.	½ to 1 dr.
Cardamomi Co.	Cardamom seeds ¼ oz., caraway fruit ¼ oz., raisins 2 ozs., cinnamon bark ½ oz., cochineal 55 grs.	60	M.	1 in 80	½ to 1 dr.
Chloroformi et Morph. Co. (Substitute for *Chlorodyne*)	Chloroform 1½ ozs., morphine hydrochloride 87½ grs., diluted hydrocyanic acid 1 oz., tincture of capsicum ½ oz., tincture of Indian hemp 2 ozs., oil of peppermint 14 ms., glycerin 5 ozs.	90	S.	¾ m. chloroform, ½ m. acid hydrocyan. dil., $\frac{1}{11}$ gr. morph. hydrochlor. in 10 ms.	5 to 15 m.
Cinchonæ Co.	Tincture of cinchona 10 ozs., bitter orange peel 1 oz., serpentary ½ oz., cochineal 28 grs., saffron 55 grs.	70	M.	½ gr. alkaloids in 110 ms.	½ to 1 dr.
Gentianæ Co.	Root 2 ozs., bitter orange peel ¾ oz., cardamom seeds ¼ oz.	45	M.	1 in 10	½ to 1 dr.
Lavandulæ Co.	Oil of lavender 45 m., oil of rosemary 5 m., cinnamon bark 75 grs., nutmeg 75 grs., red sanders wood 150 grs.	90	M.	1 in 213	½ to 1 dr.
Rhei Co. ...	Root 2 ozs., cardamom ¼ oz., coriander ¼ ozs., glycerin 2 ozs.	60	P.	10 grs. in 110 m.	½ to 1 dr. or 2 to 4 drs.
Sennæ Co....	Senna 4 ozs., raisins 2 ozs., caraway ½ oz., coriander ½ oz.	45	M.	1 in 5	½ to 1 dr. or 2 to 4 drs.

Note:—M = maceration. P = percolation. S = solution.

COMPLEX TINCTURES..

Tinctura.	Ingredients.	Alcohol p.c. in menstruum.	Process.	Strength.	Dose.
Aloes ...	Extract of Barbados aloes ½ oz., liquid extract of liquorice 3 ozs.	45	M.	1 in 40	½ to 1 dr. or 1½ to 2 dr.
Catechu ...	Catechu 4 ozs., cinnamon bark 1 oz.	60	M.	1 in 5	½ to 1 dr.
Ergotæ Ammoniata	Ergot 5 ozs., solution of ammonia 2 ozs.,	60	P.	1 in 4	½ to 1 dr.
Guaiaci Ammoniata .	Resin 4 ozs., oil of nutmeg 30 ms., oil of lemon 20 ms., strong solution of ammonia 1½ ozs.	90	M.	1 in 5	½ to 1 dr.
Iodi ...	Iodine ½ oz, potassium iodide ½ oz., water ½ oz.	90	S.	1 in 40	2 to 5 m.
Kino ...	Kino 2 oz., glycerin 3 ozs., water 5 ozs-	90	M.	1 in 10	½ to 1 dr.
Opii Ammon... (*Scotch Paregoric*)	Tincture of opium 3 ozs., benzoic acid 180 grs., oil of anise 1 dr., solution of ammonia 4 ozs.	90	S.	5 grs. of opium in 1 oz.	½ to 1 dr.
Quininæ Ammon.	Quinine sulph. 175 grs., solution of ammonia 2 ozs.	60	S.	2 grs. in 110 ms.	½ to 1 dr.
Valerianæ Ammoniata	Rhizome 4 ozs., oil of nutmeg 30 ms., oil of lemon 20 ms., solution of ammonia 2 ozs.	60	M.	1 in 5	½ to 1 dr.

Note :—M = maceration. P = percolation. S = solution.

Trochisci. **Troches** or **Lozenges** are flat solid tablets composed of a basis and one or more active drugs uniformly divided, for the purpose of slowly melting in the mouth. They are prepared either with a Fruit basis, Rose basis, Simple basis or

Tolu basis. The new B. P. has the following for the preparation of these bases :—

Fruit basis :—Take 500 times the quantity of the drug ordered for one lozenge ; mix it intimately with fifteen and a half ounces of refined sugar in fine powder and 300 grains of gum acacia in powder Make the mixture into a paste with 1¼ fluid ounce of mucilage of gum acacia and 2 ounces of the black-currant paste of commerce previously softened with boiling distilled water. Divide the mass into 500 lozenges and dry them in a hot-air chamber at a moderate temperature.

Rose basis :—This is made in the same way as above, except that it is flavoured with rose water and two ounces more sugar are added.

Simple basis :—This is made in the same way as the *Rose basis*, except that it has neither rose water nor black-currant paste.

Tolu basis :—This is made in the same way as the above, except that three fluid drachms of Balsam of Tolu are added to the mass instead of rose water or currant paste.

There are 17 Lozenges in the B. P. and they are :—

Trochiscus.	Ingredients.	Basis.	Strength in each.	Action and use.
Acidi Benzoici.	Benzoic acid	F.	½ gr.	Antiseptic and expectorant.
Acidi Carbolici	Phenol	T.	1 gr.	Antiseptic and a local stimulant.
Acidi Tannici.	Tannic acid	F.	½ gr.	A local astringent
Bismuthi Co... (*known as Antacid Lozenge.*)	Bismuthi oxycarbonate, heavy magnesium carb., precipitated calcium carb.	R.	2 grs. 2 grs. 4 grs.	Antacid.
Catechu ...	Catechu.	S.	1 gr.	A local astringent
Eucalypti Gummi ...	Eucalyptus gum.	F.	1 gr.	A local astringent
Ferri Redacti.	Reduced iron.	S.	1 gr.	Hæmatic tonic.
Guaiaci Resinæ	Guaiacum resin.	F.	3 grs.	Checks acute tonsillitis.
Ipecacuanhæ ..	Ipecacuanha root.	F.	¼ gr.	Expectorant.
Krameriæ ...	Extract of krameria.	F.	1 gr.	Astringent.
Krameriæ et Cocainæ	Extract krameria, cocaine hydrochloride.	F.	1 gr. $\frac{1}{20}$ gr.	A local astringent and anæsthetic.
Morphinæ ...	Morphine hydrochloride	T.	$\frac{1}{36}$ gr.	Allays cough.
Morphinæ et Ipecacuanhæ	Morphine hydrochloride, ipecac. root.	T.	$\frac{1}{36}$ gr. $\frac{1}{12}$ gr.	Allays cough.
Potassii Chloratis ...	Potassium chlorate.	R.	3 grs.	Alterative in relaxed throat and aphthous mouth.

Note :—F = Fruit. R = Rose. S = Simple. T = Tolu.

Trochiscus	Ingredients.	Basis.	Strength in each.	Action and use.
Santonini ...	Santonin.	S.	1 gr.	A vermicide for round worms.
Sodii Bicarbonatis	Sodium bicarbonate.	R.	3 grs.	Antacid.
Sulphuris ...	Precipitated sulphur, cream of tartar, sugar, gum acacia, mucilage and tincture of orange.	—	5 grs.	A mild laxative.

Unguenta. Ointments are semisolid or soft preparations containing some active drugs mixed with fatty, oily or paraffin basis, for external application. Lard plain or benzoated, glycerin, oleic acid, spermaceti, almond oil, olive oil, lanoline, prepared suet, beeswax, &c., alone or in combination, form the basis of all B. P. ointments.

There are 44 ointments in the B. P., which can be divided into two classes, *viz*,—(1) *General* and (2) *Special*. The special ointments can again be subdivided into *Lead* and *Mercurial ointments*. 30 come under **General,** 4 under **Lead** and 10 under **Mercury**.

GENERAL OINTMENTS.

Unguentum.	Composition.	Strength.	Action and use.
Acidi Borici ...	Boric acid 1 oz., white paraffin ointment 9 ozs.	1 in 10	Antiseptic.
Acidi Carbolici	Phenol ½ oz., glycerin 1½ ozs., white paraffin ointment 10½ ozs.	1 in 25	Antiseptic and deodorant.
Acidi Salicylici	Salicylic acid 10 grs., paraffin ointment 490 grs.	1 in 50	Antiseptic.
Aconitinæ ...	Aconitine 10 grs., oleic acid 80 grs., lard 410 grs.	1 in 50	A powerful local analgesic and sedative.
Aquæ Rosæ ... (*Cold Cream*)	Rose-water undiluted 7 ozs., white bees wax 1½ ozs., spermaceti 1½ ozs., almond oil 9 ozs., oil of rose 8 ms.	7 in 12	Fragrant, emollient and demulient.
Atropinæ ...	Atropine 10 grs., oleic acid 40 grs., lard 450 grs.	1 in 50	A local anodyne.
Belladonnæ ...	Liquid extract (evaporated) 2 ozs., benzoated lard 2¼ ozs.	·6% alkaloid	Anodyne and antiphlogistic.

Unguentum.	Composition.	Strength	Action and use.
Cantharidis ...	Cantharides 1 oz., benzoated lard 10 ozs.	1 in 10	Rubefacient.
Capsici ... (Known as *Chili Paste.*)	Fruit 120 grs., spermaceti 60 grs., olive oil 1 oz.	1 in 4½	Rubefacient.
Cetacei ...	Spermaceti 20 ozs., white beeswax 8 ozs., almond oil 72 ozs., benzoin 2 ozs.	1 in 5	Emollient and demulcent.
Chrysarobini...	Chrysarobin 20 grs., benzoated lard 480 grs.	1 in 25	Antiparasitic and a stimulant application for psoriasis.
Cocainæ ...	Cocaine 20 grs., oleic acid 80 grs., lard 400 grs.	1 in 25	A local anæsthetic.
Conii ...	Conium juice 2 ozs., hydrous wool fat ¾ oz.	2 in 1	A local anodyne in painful conditions of anus and rectum.
Creasoti ...	Creasote 1 oz., hard paraffin 4 ozs., soft paraffin white 5 ozs.	1 in 10	Antiseptic.
Eucalypti ...	Oil of eucalyptus 1 oz. hard paraffin 4 ozs., soft paraffin white 5 ozs.	1 in 10	Antiseptic.
Gallæ ...	Galls 1 oz., benzoated lard 4 ozs.	1 in 5	An astringent application for hæmorrhoids.
Gallæ c. Opio	Gall ointment 925 grs., opium powdered 75 grs.	7½ % opium	Anodyne and astringent in inflamed piles.
Hamamelidis	Liquid extract ¼ oz., hydrous wool fat 2¼ ozs.	1 in 10	Astringent (for piles).
Iodi ...	Iodine 20 grs., potassium iodide 20 grs., glycerin 60 grs., lard 400 grs.	1 in 25	Irritant, resolvent and alterative.
Iodoformi ...	Iodoform ¼ oz., paraffin ointment (yellow) 2¼ ozs.	1 in 10	Disinfectant, antiseptic and antisyphilitic.
Paraffini ...	Hard paraffin 3 ozs., soft paraffin 7 ozs	3 and 7 in 10	A basis for ointment (demulcent.)
Picis Liquidæ	Tar 5 ozs., yellow bees wax 2 ozs.	5 in 7	A local stimulant and antiseptic.
Potassii Iodidi	Potassium iodide 50 grs., potassium carbonate 3 grs., water 47 grs. benzoated lard 400 grs.	1 in 10	Alterative and resolvent.
Resinæ ... (*Basilicon Ointment.*	Resin 8 ozs., yellow bees wax 8 ozs., olive oil 8 ozs. lard 6 ozs.	1 in 3¾	Stimulant to indolent sores.

Unguentum.	Composition.	Strength	Action and use.
Staphisagriæ...	Seeds 2 ozs., yellow bees wax 1 oz., benzoated lard 8½ ozs.	1 in 5¾	Parasiticide. Destroys pediculi.
Sulphuris ...	Sublimed sulphur 1 oz., benzoated lard 9 ozs.	1 in 10	Antiparasitic. Cures scabies.
Sulphuris Iodidi	Sulphur iodide 20 grs , glycerin 20 grs., benzoated lard 460 grs.	1 in 25	Antiparasitic and a local stimulant.
Veratrinæ ...	Veratrine 10 grs., oleic acid 40 grs., lard 450 grs.	1 in 50	A local anæsthetic.
Zinci ...	Zinci oxide 3 ozs., benzoated lard 17 ozs.	3 in 20	A mild astringent for eczema.
Zinci Oleatis...	Zinc sulphate 2 ozs., hard soap shavings 4 ozs., boiling water and white soft paraffin of each *q. s.*	1 in 2	A mild astringent for eczema.

4 ointments contain alkaloids ; *viz.*—Ung. Aconitinæ, Ung. Atropinæ, Ung. Cocainæ and Ung. Veratrinæ. They are all prepared with Oleic Acid and Lard.

LEAD OINTMENTS.

Unguentum.	Composition.	Strength.	Action and use.
Glycerini Plumbi Subacetatis	Glycerin of lead subacetate 1 oz., white paraffin ointment 5 ozs.	1 in 6	A local astringent and sedative.
Plumbi Acetatis...	Acetate of lead 20 grs. white paraffin ointment 480 grs.	1 in 25	Do.
Plumbi Carbonatis	Lead carbonate ¼ oz,, white paraffin ointment 2¼ ozs.	1 in 10	A local mild astringent.
Plumbi Iodidi ...	Lead iodide ¼ oz. yellow paraffin ointment 2¼ ozs.	1 in 10	Alterative and resolvent for chronic enlargements.

MERCURIAL OINTMENTS.

Unguentum.	Composition.	Strength	Action and use.
Hydrargyri ... (*Blue Ointment.*)	Mercury 1 lb., lard 1 lb., prepared suet 1 oz.	1 in 2	Resolvent, antiparasitic, antisyphilitic.
Hydrargyri ammoniati (*White Precipitate Ointment.*)	Ammoniated mercury 1 oz., white paraffin ointment 9 ozs.	1 in 10	Antiparasitic. Destroys pediculi. Useful in chronic skin diseases.
Hydrarg Comp. (Substitute for *Scott's Ointment.*)	Mercury ointment 10 ozs., yellow beeswax 3 ozs., olive oil 6 ozs., camphor 3 ozs.	1 in 5 of mercury	Absorbent. Useful in carbuncles, indolent tumors, glandular enlargements, &c.
Hydrargyri Iodidi Rubri .	Red iodide 20 grs., benzoated lard 480 grs.	1 in 25	A local stimulating absorbent and rubefacient. Used in goitre.
Hydrarg. Nitratis (*Citrine Ointment.*)	Mercury 1 oz. nitric acid 3 ozs., lard 4 ozs.. olive oil 7 ozs.	1 in 15 of mercury	A local alterative, astringent and stimulant.
Hydrarg. Nitratis Dil.	Mercuric nitrate ointment 1 oz.. and yellow soft paraffin 4 ozs.	1 in 5	Same as above. Invaluable in inveterate eczema and tinea tarsi.
Hydrarg. Oleatis	Mercuric oleate 1 oz., benzoated lard 3 ozs.	1 in 4	Same as Ung. Hydrarg. but easily absorbed.
Hydrarg. Oxidi Flavi (substitute for *Golden Ointment*)	Yellow mercuric oxide 10 grs., soft paraffin (yellow) 490 grs.	1 in 50	Alterative, stimulant. In chronic eczema, ringworm, syphilitic eruptions. Diluted, in conjunctivitis.
Hydrarg. Oxidi Rubri (*Red Precipitate Ointment*)	Red mercuric oxide ¼oz., yellow paraffin ointment 2¼ oz.	1 in 10	Caustic. Diluted, same as above.
Hydrarg. Subchloridi (*Calomel Ointment*)	Mercurous chloride ¼oz., benzoated lard 2¼ ozs.	1 in 10	Antisyphilitic, alterative and resolvent. Relieves itching, rarely causes salivation.

Vina. Wines are weak tinctures of drugs made with sherry or orange wine instead of alcohol. These are prepared either by solution or maceration like tinctures, but never by percolation. The menstruum used is either sherry as in the case of antimony, colchicum, iron, ipecacuanha ; or orange wine as of iron citrate and quinine. The sherry must be good otherwise the wines would spoil soon.

Vinum.	Composition.	Process.	Strength.	Dose.
Antimonialis .	Tartarated antimony 40 grs., boiling water 1 oz., sherry *q. s.* to 1 pt.	S.	2 grs. in 1 oz.	10 to 30 m. or 2 to 4 drs.
Aurantii ...	A fermented saccharine solution to which fresh bitter-orange peel has been added.	Vinous fermentation.	10 to 12 p. c. of alcohol.	——
Colchici ...	Corm 4 ozs., sherry 1 pt.	M.	1 in 5	10 to 30 m.
Ferri ...	Iron wire 1 oz., sherry 1 pt.	M.	Variable.	1 to 4 drs.
Ferri Citratis.	Iron and ammonium citrate 160 grs., orange wine *q. s.* to 1 pt.	M.	1 gr. in 1 dr.	1 to 4 drs.
Ipecacuanhæ..	Liquid extract 1 oz., sherry 19 ozs.	M.	1 in 20	10 to 30 m. or 4 to 6 drs.
Quininæ ...	Quinine hydrochloride 20 grs., orange wine 1 pt.	S.	1 gr. in 1 oz.	$\frac{1}{2}$ to 1 oz.
Xericum ... (*Sherry*)	A Spanish wine.	——	16 % alcohol.	——

NON-OFFICIAL OR NON-PHARMACOPŒIAL PREPARATIONS.

Few practitioners of medicine of the present day, do confine their prescriptions to the range of the official Pharmacopœia, but use a host of other preparations, which are being daily brought to their notice, by the enterprising manufacturing pharmacists. The list is ever increasing. We would therefore limit our descriptions to those only, that are ordinarily used in practice.

Balnea. Baths.—The immersion of the whole or a part of the body in some liquid or vapor is called a bath. It is **general** when the whole body is brought to its influence, and **local** when a part only.

Properly speaking, only medicated baths can come under non-official preparations, but we think this is a fit place for giving a description of the different kinds of medicated and non-medicated baths. Dr. Brunton has nicely classified them, and we quote his table below :—

- I. Water
  - A. Simple.
    - Cold.
      - (1) Ordinary full bath.
      - (2) Affusions.
      - (3) Spray.
      - (4) Sitz-bath.
      - (5) Foot-bath.
      - (6) Cold pack.
      - (7) Compresses.
      - (8) Douches.
    - Hot.
      - (1) Tepid bath.
      - (2) Warm bath.
      - (3) Hot bath.
      - (4) Hot foot-bath.
      - (5) Hot sitz-bath.
  - B. Medicated.
    - (1) Sea-bathing.
    - (2) Common Saline bath. Artificial sea-water made by dissolving bay-salt in water (1 lb. of salt in 30 gals. of water.)
    - (3) Carbonic acid and saline.
    - (4) Acid bath.
    - (5) Alkaline bath.
    - (6) Sulphurated bath.
    - (7) Mustard bath.
    - (8) Pine bath (Fichtennadelbad.)
- II. Vapour.
  - A. Aqueous.
    - 1. Simple
      - Russian.
      - Simple Vapour.
    - 2. Medicated Vinegar.
  - B. Volatalised drugs, *e. g.* Calomel.
- III. Air .... Turkish bath.

A few demand more than a passing notice.—

A. **Cold Bath.**—Temp. 35° to 70° F. Average 50° to 60° F. It has a powerful **tonic** action, increasing digestion, metabolism and body weight ; but in order to obtain these effects, the bath should not be continued long after the primary reaction has set in. If it is prolonged, it may cause secondary depression followed by a delayed reaction. In fevers, it **abstracts heat**, and thereby lessens tissue change and prevents complications ; hence, it is very useful in hyper-pyrexia of **rheumatism, typhus, typhoid** and **remittent fevers**, and **pneumonia**. The bath must be repeated if the temparature rises. There are several ways of using a cold bath. The following are a few examples :—

1. **Cold Affusion.**—In which 5 to 6 gallons of cold water are thrown over the body. It is valuable for resuscitating persons from **syncope, narcotic poisoning, convulsions, sunstroke, hysteria,** &c.

2. **River Bath.**—Bathing in the river is more invigorating than a full cold bath either in a tub, reservoir or tank. It stimulates digestion,

tones nerves and strengthens, muscles especially if it is accompanied with swimming, or the current of the water is very strong.

3. **Cold Shower Bath** is an effective **tonic**, being useful in mania, hysteria, sunstroke, &c. **Needle Bath** is a circular fine shower bath.

4. **Cold Sitz Bath or Cold Hip Bath.**—In this, a person sits in a tub with his hips under water. The vessels of the cooled surface and intestines first contract and then dilate especially when friction is applied.

5. **Cold Foot Bath** tones and strengthens the feet, but is to be avoided during menstrual period. The Hindu females of Bengal, who walk bare-footed and wash their feet many times a day, can bear it without harm.

6. **Cold Wet Sheet Pack** is done thus:—Spread two blankets over the bed covering the pillow. Thoroughly wet a bed sheet and spread it over them. Strip the patient naked and make him lie on his back on the sheet. Wrap him *tightly* with the sheet and blankets, the ends of the sheet being carefully tucked on each side and the feet covered. Cover him with two or more blankets, the face being kept open. After a short feeling of chilliness, the patient experiences a delightful glow followed by copious perspiration, thereby reducing the temperature, delirium, and irritability. After ½ to 1 hour, the packing is removed and the body well rubbed over by dry towels.

Instead of cold, tepid or warm water can be substituted. The above description applies to **general packing**, which is usefully employed in **specific fevers**, such as, measles, scarlatina, small pox, &c., to help the development of the rash, or to bring it out if it had receded. To reduce **delirium**, **excitement**, and **hyperpyrexia** and in **mania** and **insomnia**, it is always useful. A **Local wet pack** can be used in pneumonia, chronic diarrhœa, &c. A **cold compress** round the throat, checks the inflammation of acute tonsillitis.

6. **Cold Douche.**—In this, a single stream of water is forcibly directed against a part of the body. Its effects depend mainly upon the size, height and temperature of the stream, as well as the extent of the surface affected. The douche can be usefully directed against (*a*) the *head*, in alcoholic coma and narcotic poisoning; (*b*) the *spine*, in spermatorrhœa, melancholia and general debility; (*c*) the *liver and spleen*, for chronic congestion and enlargement; (*d*) the *joints*, for chronic inflammation and stiffness; (*e*) the *perineum*, in which case an **ascending douche** with a rose is used, in pruritus ani, hæmorrhoids and spermatorrhœa; (*g*) the *vagina*, in leucorrhœa, (a very hot uterine douche arrests post-partum hæmorrhage); (*h*) the *rectum*, in constipation and hæmorrhage.

7. **Cold Sponging.**—In this, the surface of the body is freely sponged over while the patient is sitting or standing on a shallow tub. It has a tonic and bracing effect, and is serviceable in laryngismus stridulus, chorea, rickets, spermatorrhœa, &c.

8. **Ice Bag and Lieter's Coil.**—For local application of cold to the head, chest or abdomen, an indiarubber bag filled with ice or a closely wound coil of metal tubing through which a continuous stream of water is allowed to flow out, can be applied.

B. **Warm or Hot Bath.**—It may be either *medicated* or *non-medicated*, *general* or *local*. It (*a*) softens the dermis and liquefies the fatty secretions, and hence acts as a good **detergent** in many scaly and scabby skin diseases; (*b*) stimulates local circulation and lessens that of the internal organs, whereby relieves **pain** of intestinal, biliary and renal colics; (*c*) relaxes tissues and relieves muscular spasms in urethral stricture, colics, laryngeal spasms, hernia, infantile convulsions &c.; and (*d*) stimulates the secretion of sudoriferous glands, by which many kidney diseases and uræmia are benefited.

Great care should be taken during and after a hot bath. The patient must be quickly dried, covered and put to a warm bed. A cup of hot tea, hot milk or hot water greatly helps diaphoresis.

1. **Tepid Bath.**—Temp. 85° to 95°F. It has a detergent, sedative and antipyretic effect. Useful in pyrexia and restlessness.

2. **Warm Bath.**—Temp. 95° to 100°F. Used in fevers, threatening inflammatory affections, &c.; as bronchitis, pneumonia, colics, uræmia, &c.

3. **Hot Bath.**—Temp. 100° to 106° F. Action is the same as above, but more powerful.

4. **Hot Foot Bath.**—To arrest threatened catarrh, cold in the head, epistaxis, infantile convulsions, and to restore menstrual discharge stopped by cold.

5. **Hot Sitz Bath.**—Useful in amenorrhœa, dysmenorrhœa, sudden cessation of menstruation from cold, dysuria, cystitis, &c. The addition of a little **mustard** helps to re-establish the menstrual flow more quickly.

6. **Hot Water Sponging.**—The sponging of the head, temples and neck with hot water relieves headache of influenza, catarrh and other diseases.

7. **Sir J. Simpson's Poor Man's Bath** is made by filling 6 to 8 bottles with hot water and then encasing them with stockings wet with hot water. These are put by the side of the patient under blankets.

8. **Fomentations** and **Hot Poultices** are local warm baths (which see).

C. **Medicated Baths.**—In these, medicinal agents are dissolved in cold or warm water. They may be divided into the following.—

1. **Sea Bath.**—On account of the various saline ingredients held in solution, sea-bathing is more invigorating, and more stimulating to the skin; especially when the water is boisterous. Moreover, the temperature being more or less uniform, sea-bathing is more easily borne by the weak.

2. **Carbonic Acid Bath.**—It is a stimulating saline bath containing Sodium Chloride 3 p. c., Calcium Chloride 1 p. c., Carbonic Acid Gas (free) up to 3 grammes to 1 litre. Recommended in heart diseases either functional or organic. The effect of **Nauheim bath** is due to the saline and gaseous constituents.

3. **Acid Bath.**—In this a flannel roller 1 foot broad is soaked in a bath containing diluted nitro-hydrochloric acid 8 ozs. in 1 gallon of water

at 98°F, and wrapped twice round the hepatic region, after wringing out the superfluous lotion. It is now completely covered by a piece of oiled silk leaving a little margin. The bath should be renewed morning and evening and worn for days. Useful in hepatic disorders.

4. **Alkaline Bath** is made by dissolving crystallised Sodium Carbonate (1 dr. to 1 gal.) in water, and is useful in removing scabs and scaly incrustations.

5. **Mustard Bath.**—(½ to 1 dr. in 1 gal.).—A powerful stimulant to the skin, being used to quicken the appearance of exanthematous eruptions. The patient being in the bath from 5 to 10 minutes.

6. **Bran Bath.**—Bran 4 lbs are boiled in water 1 gallon and strained. This liquor is added to water sufficient for a bath. It removes irritation of the skin.

7. **Nim Bath.**—It is prepared by adding the decoction of leaves of *Melia Azadirachta* to the ordinary bath. It may be general or local, and is largely employed by the natives of India in various skin diseases. The writer has cured two obstinate cases of urticaria by giving daily *Nim* baths.

8. **Mineral Water Bath.**—A course of baths in any of the spas has special advantages. The effects of a bath in simple thermal water are similar to those derived from an ordinary warm bath; but they differ according to the composition of the mineral waters. Thus, bathing and drinking sulphur water are very efficacious in chronic rheumatism, gout, hepatic congestion, &c.

D. **Vapour Bath.**—This may be aqueous or medicated. **Steam Bath** may be made by boiling water over a spirit lamp under a cane-bottomed chair, on which the patient sits, enveloped completely, except the head, by one or two blankets. Action and uses are the same as those of hot water bath. **Calomel fumigation** is given in the same way except 20 to 30 grs. of the drug are volatalised. (see Fumigation)

E. **Air Bath.**—**Hot air bath** can be employed like steam bath, by simply burning a spirit lamp under a chair, or introducing a lighted spirit lamp specially made under the bed clothes. In a **Turkish bath**, there are 3 or 4 rooms with gradually increasing temperatures. Either of these baths is useful in rheumatism, gout, malarious fever, renal and skin diseases.

SCALE OF TEMPERATURES OF BATHS (Startin).

Bath.	Water.	Vapour.	Hot Air.
Cold	33° to 65° F.		
Cool	65° to 75° F.		
Temperate ...	75° to 85° F.		
Tepid	85° to 92° F.	90° to 100° F.	96° to 106° F.
Warm	92° to 98° F.	100° to 115° F.	106° to 120° F.
Hot	98° to 112° F.	115° to 140° F.	125° to 170° F.

Bolus is a large pill containing over ten grains of powdered ingredients. In England, when a bolus is ordered, it is dispensed as one large firm pill. Such is also the case in Calcutta. But in Ireland and elsewhere, it is sent out as a soft paste or confection enclosed within waxed or oiled paper, folded like a powder, with directions to scrape it off with a spoon and to swallow it down like jam. The most convenient plan, when a large dose of nauseous powder is to be administered, is to give it in a cachet, or to take it down wrapped up in wafer paper.

Buginaria. Bougies are long elongated cylindrical preparations containing active drugs mixed with the suppository basis for introduction into the urethral and the nasal cavities. Bougies are made like suppositories only differing from them in shape. They can be made in a metallic mould, but the basis must be liquified and thoroughly mixed with the drugs before pouring into into it, for the bore of the mould being narrow, there is a chance of the melted mixture getting clogged in the way. Another more convenient method is to take a long glass tube having a bore of the size of a bougie and a glass rod of equal length which can just be passed through the glass tube, to push out the mass when set, and then to cut it into required sizes, one end being manipulated to a blunt point.

Cachets are wafer-paper capsules. They consist of two concave or watch glass shaped halves or discs of wafer-paper stuck together at the rims by moisture. Any nauseous or bitter drug can be thus enclosed between the two halves and swallowed without getting its taste. Cachets are made by a machine, and should be dipped in water immediately before swallowing.

Capsules.—A capsule is a gelatin sac enveloping a dose of some nauseous or disagreeable drug. There is a growing tendency amongst the medical men to prescribe nauseous drugs in capsules. It is therefore necessary that the dispenser should be acquainted with the method of capsule making. The requisites are *moulds* or *olives*. These are globular or egg shaped heads of Britannia metal fixed on metal rods, which are then fixed into a perforated wooden slab made for the purpose, and having a handle fixed in the centre at the back of the slab.

The capsules may be either *hard* or *soft*, but the latter variety is now popular. The following formula gives a good flexible mass :—

Gelatin 25, Glycerin 10, Sugar 8, Water 45 ; soak gelatin in water and add the rest, and dissolve on a water-bath and preserve.

To make capsules the moulds and upper portions of the rods should be oiled, and the above mass be heated to 104° F. The mould-holder is now lifted by its handle and the moulds are dipped completely for a few seconds in the melted mixture. Steadily lift up the mould-holder and rotate the moulds so that the gelatin mass may set perfectly even. After a stay of ¼ hour or more, these capsules are gently pulled off from the moulds and placed with their tails upwards in the openings of a perforated wooden tray called "supporter." The tail ends being cut off by a pair of scissors, they are filled with liquids by a syringe, or with powders by a paper funnel. The openings are now sealed by a drop of liquified gelatin and they are exposed to air for a few hours to dry.

Carbasa Antiseptica. Antiseptic Gauzes are mulmuls steeped in some antiseptic solution and dried afterwards. It is not easy to prepare them on a small scale. When the antisepeic is volatile, resin and oil should be combined with it. The following is the process for an extemporaneous preparation. Take two yards of gauze having 30 threads to the linear inch, hang it over a string, and spray it over uniformly the required volume of antiseptic solution on each side, turining once or twice until the whole of it is used. Or the folded gauze may be dipped into the solution in a deep dish, and turned over and over until the whole of it is equally absorbed, and then taken out, unfolded and dried.

Cataplasmata. Cataplasms. Poultices consist of linseed meal, bread or starch made into a soft paste with hot or cold water for local application. They may be **hot** or **cold, medicated** or **non-medicated**. A hot poultice is the best means of locally applying warmth and moisture as well as medicaments. To prepare a hot linseed poultice, the linseed meal is either mixed with boiling water with constant stirring, or a mixture of meal and water heated on fire. In whichever way it is made, the paste must not be lumpy, too soft or too dry. Now, it is quickly and evenly spread over a piece of muslin of the required shape and size, of course keeping its margins about 2 inches free for turning over the poultice. After application it must be covered with flannel to maintain heat, and bandaged. If it is made with powdered cake instead of crushed linseed, some linseed or olive oil is to be added. Bread, flour with milk or water, make also good poultices. Hot bran poultice though lighter soon gets cold unless put in a flannel bag.

If the poultice is intended for a sore, boil or abscess, it must be in contact with the skin without a cloth intervening.

Ice poultice can be prepared by spreading over a twofold piece of gutta percha tissue, a thin layer of cotton-wool, and over it a layer of powdered ice and a little salt ; and then covering the ice with the remaining half of the gutta percha and sealing the margins with chloroform The whole thing being placed within a flannel bag. Sometimes a layer of linseed-meal is put on the ice.

Tokmalanga or *Tokmari* (seeds of *Ocimum Basilicum*) make a capital demulcent and emollient cold poultice when soaked in water for a few minutes.

Cerata. Cerates are ointments whose basis contains wax. They are official in the U.S.P. They are harder than ordinary ointments, but softer than plasters.

Cigarettes are made in the same way as ordinary cigarettes, except that some drugs are substituted for tobacco ; as Arsenical and Datura Cigarettes.

Chloroform Tinctures.—These are tinctures of drugs made with chloroform instead of alcohol ; as Chloroformum Aconiti and Chloroformum Belladonnæ, B.P.C. (see Aconite and Belladonna.)

Collunaria are lotions used as nasal douches.

Collutoires are throat or mouth paints ; as Glycerinum Acidi Borici. Collutoir is a French term.

Collyria are eye-lotions or eye-washes. Sometimes they are called eye-drops.

Cremora. Creams are soft or similiquid preparations having glycerin, vaseline or some similar substances as a basis for external application; as Cold Cream.

Dentifrices are preparations used for cleansing teeth. They may be a powder, paste, soap or liquid.

Depilatories are preparations used for the removal of superfluous hairs. Their effects depend upon the presence of a sulphide and a caustic alkali. Pastes prepared fresh are to be applied as thick as the blade of a knife, and washed away as soon as the burning commences. The softened hairs being scraped off by a blunt knife, or a bone spatula. Cold cream being applied to the washed parts. Deep and painful ulcerations may result from incautious application of chemical pastes. Those containing orpiment are more dangerous than those having barium sulphide.

Elæosacchara, Aromatic Sugars or **Oil Sugars.**—These are more common on the Continent than in England, and are made by triturating 9 minims of volatile oils to 1 onnce of sugar. They are used as flavouring agents. Anise, Fennel and Peppermint have *elæosacchara.*

Elixiria. Elexirs.—These are weak tinctures of drugs rendered pleasant and agreeable by the admixture of sugar and aromatics.

Emulsiones. Emulsions are mixtures of insoluble drugs minutely divided and suspended in water by mucilage or other substances. An emulsion can be made by (1) *saponification* by adding an alkali or Tr. Quillaiæ or Tr. Senegæ to a fixed oil; and by (2) *suspension* of a resinous substance by mucilage or by yolks of eggs; as emulsion of the oil of turpentine.

Enemata. Enemas. Clysters. Lavements. Rectal Injections.—A liquid preparation introduced into or through the rectum by means of a suitable instrument is called an enema.

If the injection is meant to evacuate the bowels, 1 to 2 pints of liquid are injected, the patient lying on his left side; but when it is intended that it should be retained, a small quantity—2 to 4 ozs should be used. If it is considered desirable to introduce 3 to 6 pints, the liquid must be slowly put in, while the patient is lying first on his left, then on his right side with his pelvis raised, or if necessary, on his knees and elbows, pressing the anus with a towel, whenever there are expulsive cramps. It must be borne in mind that the process of injection should be carried on slowly and with occasional pauses, otherwise the enema will be expelled by premature contraction of the intestine. The temperature of the liquid should be about 98° F. Cold water is soon rejected.

The following are the chief varieties of enemas with their uses:—

1. **Anthelmintic Enemata** are chiefly used to expel thread-worms. (See Anthelmintics.)

2. **Antispasmodic Enemata.**—For this purpose an injection of Oil of Turpentine, Asafetida, Bromides, Hydrate of Chloral, Ether, &c. is given when the intestine is distended with flatus or getting cramped; as Enema Terebinthinæ, Enema Asafetidæ, &c. Enema Tabaci is very depressant and should not be used.

3. **Astringent Enemata.**—These are used for checking diarrhœa,

rectal hæmorrhage and mucous discharge from the rectum and lower bowels.

4. **Emollient Enemata.**—A decoction of starch, linseed or barley soothes the irritable mucous membrane of the rectum and colon.

5. **Sedative Enemata.**—These are used in painful affections of the rectum, bladder and uterus. Opium is used for this purpose.

6. **Purgative Enemata.**—These are often resorted to when the lower bowels are to be evacuated. Ordinarily, for an adult 1 pint, for a child of 4 years of age 4 to 6 ozs., and for an infant 1 oz. are enough. Soap and warm water, thin gruel and castor oil or olive oil &c. are often used for this purpose. Glycerin 2 to 4 drs. injected into by a suitable syringe or a glycerin suppository introduced into the rectum, evacuates the bowels speedily (see p. 84), and can be used in native practice without much objection.

7. **Nutrient Enemata.**—In case where the food cannot be swallowed by the mouth or retained in the stomach, peptonised milk, beeftea, eggs beaten up either alone, with brandy or with milk, &c., can be injected ; but not more than 4 ozs. at a time. If there is irritability of the rectum, the addition of a few drops of Liquor Opii Sedativus will check rejection. Rectal digestion is greatly facilitated by the combination of pancreatin and pepsin with the nutrient enemas. Before giving the nutrient enema, the bowels if loaded, should be cleared by an enema of warm water or gruel.

8 **Suppositories of predigested food** can be introduced where the rectum rejects liquid nutrient enemas. These can be obtained ready made. Each meat suppository of B. W. Co. contains the digested equivalent to ½ oz. of fresh beef, and each milk suppository, the digested equivalent to 5 drs. of fresh milk.

Fomenta. Fomentations consist of flannels, cloths or sponges wrung out of hot water, to which a drug may or may not have been added, for application to the surface of the body.

The proper way to apply fomentations is to take a twofold piece of flannel large enough to cover the affected part. Immerse this folded flannel in a kettle of boiling water or pour boiling water over it in a basin, and lift it by a pair of tongs or a stick, and put it on a wringer—a stout towel or duster with sticks attached to both ends. The water is then squeezed out as much as possible by the twisting of the sticks in opposite directions and the flannel is immediately applied to the affected part and covered with a large piece of indiarubber sheeting or oiled silk, extending about an inch beyond the flannel. Place over this a thick layer of cotton wool, and bandage. If the full effect of fomentation is desired, the flannel should be changed every twenty or thirty minutes. In many cases, a sponge or a piece of spongio-piline wrung out of boiling water forms a convenient form of fomentation. In the case of the feet, hands or forearms, dipping them in hot water may do, but its temperature should be maintained by frequent small additions of boiling water.

If it is desired to produce a gentle counter-irritation, oil of turpentine may be sprinkled over the flannel before application. This forms the **turpentine-stupe** For an anodyne or sedative action, Laudanum may be sprinkled in the same way or a few poppy-heads or a little Opium may be put into the water before boiling.

Dry fomentation is made by filling up bags with hot bran, salt, sand or chamomile flowers. Bottles filled with hot water and covered with flannel bags or old stockings can be used for dry fomentation. A piece of flannel roasted over fire and applied also serves the purpose.

The method of applying fomentations by the natives of India is dangerous and faulty. The process above described is never attended to. Only a piece of flannel is just squeezed out of boiling water and applied, and when cold, it is again dipped into the boiling water leaving the fomented part exposed. The result is that the part fomented is exposed to alternate chills and heat. Even after fomentation, the part is not always covered. The student should learn the art and make it a point to see the fomentation done before him.

Hot antiseptic compresses.—These consist of folds of lint or rag soaked in hot antiseptic lotions and applied and covered with a piece of water-proof or gutta percha tissue ; as Boric Acid Compress.

Fumigation is a local or general bath of volatalised drugs. (see p. 65) Sulphur and mercury are chiefly used for this purpose. Mercurial fumigation, either *general* or *local*, has long been used in the treatment of secondary syphilis.

General mercurial fumigation is given in the following way :—The best apparatus for mercurial vapour bath is that of Henry Lee. It consists of a spirit lamp enclosed in a case of wire gauze, on the top of which is a small plate surrounded by a porcelain trough. About an ounce of water is poured into the trough and the lamp is lighted. When the water begins to boil, 20 to 30 grains of resublimed Calomel are sprinkled on the plate, and the apparatus is placed under a chair, on which the patient sits undressed, but surrounded by a moleskin or indiarubber cloak tied round his neck, though kept away from his body by a cane hoop. If necessary, the slit of the cloak can be opened from time to time, to allow the vapour to be inhaled. The patient should be in the bath for about ¼ hour and then removed to bed with his cloak on. The patient should not be left alone during the bath, lest he may faint.

Local mercurial fumigation is serviceable in obstinate syphilitic affections of the skin and mucous membrane. Sulphur fumigation cures scabies.

Gargarismata. Gargles.—A gargle is a liquid preparation used for topical action on the mouth, throat and pharynx. A gargle may be any of the following kinds :—

1. **Tonic gargle,** that tones the muscles of the pharynx and soft palate ; as cold or iced water.

2. **Antiphlogistic gargle,** that removes any local inflammation ; as Potassium Chlorate, Borax, Liq. Ammon. Acetat. with warm water, linseed tea, &c.

3. **Stimulant gargle,** that stimulates the mucous membrane and glands; as Capsicum (Tr. Capsicum 2 drs. to water 8 ozs.), Arnica, Myrrh, Pyrethrum, Eucalypti Gum (2 drs. to 8 ozs.), &c. These gargles often relieve deafness caused by the obstruction of Eustachian tube by the increased pharyngeal secretion.

4. **Astringent gargle,** that checks excessive secretion ; as Iron salts, Zinc salts, Alum, Tannic Acid (½ dr. to 8 ozs.), astringent infusions, &c.

5. **Antiseptic gargle,** that removes foul secretions and odors; as Carbolic Acid, Boric Acid, Potassium Permanganate, &c.

6. **Demulcent gargle,** that removes burning and irritation; as barley water, linseed tea, Isaphagul seed (*Plantago Isphagula*) tea, milk, olive oil, &c., in irritant poisoning.

Gossipia Antiseptica. Antiseptic Cottons are made by charging absorbent cotton wool with various antiseptic drugs. This is done by soaking cotton in some saturated antiseptic fluid and drying it afterwards; as Gossip. Acid. Borici, Gossip. Acid. Salicylic., &c.

Granules are minute pills. Granular preparations are very popular. The B. P. effervescing preparations are granular. (See p. 20)

Guttæ. Drops are liquid preparations used as drops; as eye-drops, drops for the ear, &c.

Haustus. Draught.—A liquid preparation or mixture when swallowed down in a single dose is called a draught; as Castor Oil draught, Hydrate of Chloral draught, &c.

Injectiones. Injections.—A liquid introduced into the body by means of a suitable instrument is called an **Injection.** The Injections can be introduced into the:—

(1) *Natural Canals* or *open cavities* of the body; as external ear, Eustachian tube, nose, nasal duct, stomach, rectum (see Enema), urethra, bladder, vagina and uterus.

(2) *Closed sacs*; as tunica vaginalis, serous cavities, synovial cavities, sheaths of tendons, cysts and chronic abscesses.

(3) *Veins*; as transfusion of blood, infusion of milk and saline solutions.

(4) *Subcutaneous tissues and muscles*; as hypodermic injections.

Insufflationes are powders blown into throat, nostrils or larynx. Laryngeal insufflation can be done thus:—A vulcanite tube curved at a suitable angle, having an aperture covered by a slide, through which the medicinal powder is introduced, is carried over the tongue to the laryngeal orifice; and the powder is either blown by the mouth or by an elastic ball attached to the end of the tube. This instrument is called the "Pulverflator." A quill or a tube half filled with powder and blown by the mouth, may do for nostrils and throat.

Jujubes are lozenges made of gum arabic and sugar. They are prepared by boiling to a suitable consistence, gum arabic 16 lbs., sugar 7 lbs. and water ½ gal. They are sometimes crystallised by a coating of sugar.

Lanolinum is an ointment or cream having hydrous wool fat as its basis; as Lanolinum Hydrargyri.

Linctus, Lincture or **Loch** is a thin confection to be slowly swallowed in small doses, so as to act on the throat. The basis of linctus is either treacle, syrup, honey or any other sweet substance. When powders are the active ingredients, they should be made very fine, before admixture with the basis.

Linteum. Lint is the lint impregnated with medicinal agents; as Linteum Acidi Borici, Linteum Iodoformi. These are prepared in the same way as antiseptic cottons.

Massæ. Masses consist of ingredients mixed together to the consistence of a pill. They are official in the U.S.P.

Masticatories are solid pieces of drugs used for chewing ; as Pellitory Root.

Mollinum is an ointment prepared with mollin or superfatted soap. It is easily washed off with water forming a lather and leaves the skin fresh and supple. As Mollinum Hydargyri. Mollin contains 17 p. c. of uncombined fat and 30 p. c. of glycerin.

Nebulæ are solutions of drugs sprayed into the throat by the help of a spray-producer ; as Nebula Acidi Lactici.

Opodeldocs or **Saponimenta** are preparations having their basis soap liniment. Medicated Opodeldocs are official in Continental pharmacopœias.

Pasta. Paste is prepared like ointment but generally without any fatty basis ; as Pasta Arsenicalis, Pasta Amyli Iodidi (Tilbury Fox). It is better to confine the term *Pasta* to preparations for external application, and *Massa* to those for internal use ; as Massa Copaibæ U.S.P.

Pastilus or **Pastil** is a soft jujube variously medicated having glycogelatin as its basis. These are used like lozenges. As Pastillus Acidi Borici T. H.

Perles are minute pills.

Pessi. Pessaries are but suppositories for introduction into the vagina. The active drugs are mixed either with cocao-butter or with gelatin mass. These may be *sedative*, *astringent* or *antiseptic*.

Pigmenta. Paints are liquid preparations used for application to the throat, skin or other parts. A pigment differs from a collutoire in that the former is used as a paint for any part of the body, whereas the latter is for brushing the throat or mouth only. As Pigmentum Acidi Borici, Pigmentum Acidi Tannici, Pigmentum Argenti Nitratis Ethereum, &c.

Steatina, Steatins, Ung. Extensa or **Salve Mulls** are ointments of a hard consistence spread on muslin, and capable of being folded and cut at pleasure. The mutton or beef suet forms their principal basis.

Sticks or Pencils are solid cylindrical rods prepared by fusing drugs and pouring the melted mass in suitable moulds ; as Toughened and Mitigated Caustics. When the melted mass is poured into a conical mould it is called a **cone** ; as Menthol Cone.

Styles are thin bougies about 2 inches long for introduction into the lachrymal sac and nasal duct

Triturationes. Triturations are solid dilutions. These are intimate mixtures of substances with sugar of milk. They are official in the U.S.P.

Vapores. Vapours. Inhalations.—These are drugs in a gaseous or atomised form brought in contact with the mucous membrane of the respiratory tract. The methods of inhalation vary with the temperatures at which drugs volatilise. Chloroform, Ether., Bichloride of

Methylene, Nitrite of Amyl vapourise at ordinary temperatures ; but to volatilise Sublimed Sulphur and Calomel, high temperatures are necessary (see Fumigation p. 70). The majority of drugs are vapourised through medium of hot water or steam. Inhalation of Vapours is best carried on from an inhaler, (see Drugs that act on the Respiratory System)

Vaselinum.—Like Lanolinum, Mollinum, it is a term applied to an ointment having vaseline as its basis.

Wafer papers are starched papers used to wrap round nauseous or bitter powders to help their swallowing without getting their taste. These are made of flour and water and become limp when moist. Cachets are made of these papers (see Cachets p. 66).

PART II.

PHARMACY AND DISPENSING.

HINTS FOR PRACTICAL PHARMACY AND DISPENSING.

The extemporaneous formulæ or prescriptions given by a physician are called *Magistral*, because they are ordered by a *Magister*, *i. e.* the master of his profession. The compounding and dispensing of these prescriptions are no doubt the ostensible duties of a dispenser. For their satisfactory discharge a certain combination of qualities are requisite for an individual undertaking them. "With some degree of physical strength and agility, he should combine a quick perception, sound judgment and firmness of resolution. He should maintain a constant and lively attention to every operation, however trifling, with which he may be occupied and evince both by night and by day a readiness to fulfil his duty in serving others, even at the sacrifice of his own convenience and pleasure."

The following hints specially prepared are likely to prove useful both to the dispenser and practitioner.

GENERAL DIRECTIONS.

1. **The Dispensing room** must be well *lighted* and well *equipped* with every necessary article, furniture and apparatus for compounding and dispensing purposes.

2. **Pure Drugs of the best quality** procurable for money are to be used, and preparations are to be made in strict accordance with the *official* and other *recognised methods*.

3. **Bottles are to be duly labelled.**—Those containing corroding fluids must have *enamelled inscriptions* or names engraved on glass. Bottles containing **poisonous** substances must bear an extra label—"**Poison**" at their shoulders. It is a a good plan to have also the *doses* printed on the labels.

4. **Poisonous Drugs** must be kept within a separate glass case under lock and key.

5. **The Counter and the apparati** for compounding and dispensing must be kept scrupulously clean, in proper order, and always ready for use. Always clean and put away every article at its respective place after use.

6. **Testing of Drugs** must be done occasionally so as to ensure their purity and strength. Substances like vegetable extracts, spirit of nitrous ether, hydrocyanic acid dilute, &c., require occasional looking after.

7. **Corks of good quality** should be used. Cracked, old, rotten and soiled corks should always be rejected. The practice of pressing corks between the teeth should never be indulged in. Fit a cork before pouring a drug into the bottle.

8. **Evidence of slovenliness** on the externals does not encourage faith as to the care with which the contents have been worked up.

9. **Prescription reading.**—Read through a prescription calmly and rapidly, without creating any suspicion in the mind of the presenter, but noting at the same time any inconsistency either in dosage or in combination.

10. **Consultation with the prescriber** must be done at once, if possible, if there is any **poisonous** or **unusually large dose**, or a grave **incompatibility** in a prescription. On no account the dispenser should alter a physician's prescription without his sanction.

11. **The Directions** on the label should be written first before dispensing. Also first, copy the prescription in the copy book, noting afterwards any peculiarity of compounding or dispensing. If the directions are in Latin, the dispenser should give their English translation. In India, the directions should be written in the familiar language of the place, when the medicines dispensed are meant for those who cannot read English.

12. **Labels** should be neatly and distinctly printed without much flourish, and their margins carefully trimmed. **"Poison," "Shake the bottle," "Not to be taken"** and other accessory labels are best placed at the **shoulder** of a bottle. If affixed on the foot, the fingers holding the bottle may cover them, or a hurried patient may overlook them. The color of labels for liniment and lotion ought to be different from that for mixture and powder. Orange-red and dark-yellow for the former and white for the latter can be used. Sometimes the labels for liniment and lotion are printed with red ink on white paper.

13. **Bottles for dispensing** mixtures should be of a different color from those used for liniments and lotions. Amber-colored or uranium bottles are best suited for silver nitrate lotions, and blue bottles for liniments. Bottles |covered with blue paper can be used for silver lotions, when uranium or amber-colored bottles are not available.

14. **The dispensing of two prescriptions simultaneously** should never be attempted. But if an infusion is to be made, the dispenser can set it on, noting on a bit of paper the time and the substance, and placing it between the cover and the pot.

15. **The position of a prescription during dispensing** must be so, that the dispenser can read it while dispensing. This can be best done either by fixing it to a hook on a counter-self, or by holding it between the index and the middle fingers of his left hand.

16. **Manipulation.**—Be expeditious in manipulation. Finish

tying, sealing, labelling and wrapping as quickly as possible. Holding powder envelopes between the lips, mixing with or dissolving substances by the aid of fingers are to be avoided.

17. **The final reading of a prescription** is essential before the medicine should leave the hands of a dispenser, so as to make a revision of his work. If there is any doubt, always begin where there is none.

18. **Wrong Delivery.**—Be careful not to deliver a wrong medicine to the presenter of a prescription. A number engraved on a brass-piece made over to the presenter and the corresponding number marked on the prescription and bottle cover, would certainly prevent such a mistake.

19. **Graduation of bottles** mnst be accurate. Want of symmetry of the bore makes a great deal of difference. Blown lines of graduation are generally wrong. Paper graduation is the best, but it must be done by hand in each case. Mark-papers should either be notched or lined equidistantly, but in either case, the number of doses should be put down in figures on the label.

20 **Repetition of prescriptions**.—If a prescription contains such drugs as are likely to produce a cumulative effect, as Strychnine, Arsenic, Lead, Digitalis, &c., the dispenser should warn the patient against repeating it for a lengthened period, without the knowledge and sanction of the prescriber.

WEIGHING AND MEASURING.

1. **Scale.**—An upright fixed beam and scale with a moveable glass pan should be used. If a hand scale is used, hold it firmly by the left hand, never lift it too high above the counter, and judge of the weight as much by the indicator as by the position of the scale. A delicate scale should be used for weighing minute quantities of powerful drugs ; such as, Strychnine, Hyoscine, Arsenic, &c.

2. **Corroding substances.**—Substances which corrode or act on the brass should be weighed upon glass pans. Almost all crystallised acids, iodine, carbonate of ammonia and many salts should not be weighed on brass pans.

3. **Soft or sticky substances**, such as soft extracts, confections. ointments, &c. should be weighed on a piece of paper spread over the right pan, after placing a corresponding piece of equal weight on the left along with the weights. Scrape the medicine by a spatula from the paper after weighing.

4. **No guess work** in weighing or measuring is allowed. Every solid drug should be weighed, and every liquid one be measured with certain exceptions.

5. **Label upwards**—Always pour liquids keeping the label of the bottle upwards, so as not to spoil the label by the trickling down of the drops of liquid left on the lip of the bottle.

6. **Minim measure.**—From a few drops to a drachm, the liquid should be measured in a minim glass. The true level of the surface of the liquid in a minim glass is the midway between the highest point close to the glass and the lowest at the centre

7. **Castor Oil, Copaiba, Glycerin,** &c. should be weighed instead of measured if not otherwise directed.

8. **Lip drops**—The drops that hang from the lip of a bottle out of which a liquid has been poured, should be caught upon the bottom of the stopper, before putting it back into the mouth.

9. **How to drop.**—Before permitting drops to fall into any mixture, the dispenser must allow a few drops to fall on the floor, till he is confident that he has a perfect control over dropping. If he is not so skilful, let him drop into an empty measure glass which he can reject if too many flow out.

10. **Volatile liquids,** such as, Ether, Chloroform, Nitrite of Amyl, Diluted Hydrocyanic Acid, &c, should always be measured instead of dropped. A solution of 10 or 20 per cent can always be kept in stock for measuring out small quantities when ordered.

11. **The size of drops** varies considerably, and therefore it is safe to give *minims* where *guttæ* are ordered. Thus, chloroform dropped from an ordinary phial will require 150 to 300 drops for one fluid drachm.

12 **Division of a grain or a minim** is best accomplished by triturating or mixing the weighed or measured quantity with sugar of milk or any liquid excipient, and dividing the mixture as ordered. If 24 pills, each containing $\frac{1}{30}$ grain of Strychnine Hydrochloride are to be dispensed, weigh one grain of the salt and triturate with 14 grains of milk-sugar. Take only 12 grains of the mixture for 24 pills.

13 **A liquid drug is always weighed** and not measured on the Continent.

WATERS.

1. **Camphor water.**—2 ozs of water dissolve only $\frac{1}{12}$ gr. of camphor. The easiest way of making a good camphor water, is to mix flowers of camphor with coarsely powdered glass, enclose and tie the mixture in a muslin bag and suspend it by a thread into the water from the cork. A good solution is obtained sooner by moving the bag up and down two or three times a day.

By dissolving 2½ drs. of spirit of camphor in 40 ozs of water, camphor water may be quickly obtained.

2. **Chloroform water** is made by the simple shaking of choloroform in water.

3. **Mint waters** are best prepared by agitating oils in hot

water, before pouring into the still and immediately commencing distillation.

4. The following **alternative method** of preparations is sanctioned by the B. P. for use in India and the colonies :—

"Aquæ Olei Anethi, Anisi, Carui, Cinnamomi, Fœniculi, Menthæ Piperitæ. Menthæ Viridis, Pimentæ.—Each of these waters may be prepared by triturating the corresponding Oil with twice its weight of Calcium Phosphate and five hundred times its volume of Distilled Water and filtering the mixture. In india and other tropical countries these waters may be used in place of the corresponding *Aquæ* of the Text of the Pharmacopœia."

DECOCTIONS.

1. **Drugs** should be coarsely powdered or sliced before they are boiled in water for 5 minutes or longer. If the comminution is too fine some sediment deposits The drugs should always be put in cold water before boiling.

2. **Decoction pots** should be enamelled or tinned and covered. A false bottom made of tinned or silver gilded copper wire half an inch or more above the bottom should be used to prevent imparting a fusty odor to the decoction from the particles of the drug adhering to the bottom of the vessel during boiling.

INFUSIONS.

1. **Drugs for infusion** should not be too finely comminuted.

2. **No other water than distilled water** boiling or cold is alone to be used.

3. **Suspension of drugs** is essential. A muslin bag containing the drugs can be suspended by a thread from the lid of a covered pot, or a Squire's or Maw's infusion pot can be used.

4. **Uniform temperature**, as far as possible, should be maintained.

5. **Hard spring water** does not give a good color, as the extractive matters are not well dissolved by it.

6. **Whenever wanted** the infusion should be made fresh. If business is very brisk, the infusion can be made and preserved for two or three weeks, by bottling hot infusions in 6 or 8 oz. bottles up to the brim, and then by covering their mouths and necks with bladder or by well fitted stoppers, so as not to allow any air to get in.

7. **Concentrated infusions** can never supply the place of fresh ones. They are however useful for field hospitals. The concentrated infusion of digitalis is inactive.

EMULSIONS AND MIXTURES.

1. **The first fundamental rule** *in the compounding of a mixture, is to avoid chemical decomposition taking place among its ingredients, unless such is the implied intention or the express order of the prescriber.*

2. **Distilled water** is the official water to be used in compounding. Tap or other waters produce a considerable change in mixtures. For example, Tinct. Card. Co. produces a brilliant crimson color with tap, and a reddish-brown with distilled water. Tinct. Lavand. Co. gives a bright mixture with distilled, and a muddy one with tap. Liquor Arsenicalis precipitates Calcium Carbonate with tap water. Hydrargyri Perchloridum produces an insoluble mercuric salt when dissolved in tap water. Tap water gives a muddy colour to a mixture containing Ferrum Tartaratum, and distilled water makes a clear solution.

3. **Order of mixing.**—It is not to the spirit of practical pharmacy to mix the ingredients in the order in which they are arranged in a prescription The dispenser should exercise his own judgment in determining the best method of effecting a combination.

It is a good plan to pour the tinctures and spirituous fluids first as they are measured into the bottle in which the mixture is to be dispensed, next add syrups and essences, and lastly fill up the bottle with the vehicle.

4. **Poisonous Drugs** such as Arsenic, Strychnine, Perchloride of Mercury, Aconite, Digitalis, Belladonna, Opium, Hydrocyanic Acid Dilute, &c., when ordered in a mixture, should be added last in perfect solution before corking, so as to avoid the possibility of adding twice.

5. **Mortar and pestle** should never be used if the ingredients are easily soluble. Dispense syrups and fluid preparations in such an order as the vehicle would finally rinse out the measure glass.

6. **Shaking.**—All mixtures should be briskly shaken before labelling, to ensure a thorough incorporation of the ingredients.

7. **Heat** should not be used to help the solution of salts when they will not entirely dissolve in cold water, for they are sure to crystallise on cooling. Suspension is the best method under such circumstances.

8. **Wholly or partially soluble vegetable drugs,** especially which contain tannin, should be *mixed with earthy and metallic salts in largely diluted solutions.*

9. **Gelatinous mixtures.**—Some mixtures become *gelatinous* on keeping, due to the growth of an organism called *viscuous ferment.* An addition of 20 per cent of alcohol to the mixture prevents this.

10. **Chemical reaction.**—If there is a chance of a chemical reaction taking place, the ingredients which are likely to act with

one another, should be freely and separately diluted or suspended, before mixing. The mucilage of acacia always suspends the precipitate uniformly, and retards or modifies to some extent the chemical decomposition.

11. **Froth.**—Sometimes a lot of froth rises when shaken, especially if the mixture contains vegetable solutions, preventing the bottle from being soon filled or corked. A few drops of alcohol removes this soon.

12. **Insoluble powders,** such as rhubarb, chalk, &c. should be triturated with a small quantity of water in a mortar to produce a thin paste, before mixing with the vehicle.

13. **Medicinal filtrates** produced in a mixture should not be filtered but suspended. But, if any foreign particles float on a clear solution, they should be removed either by straining or by filtration through wetted cotton or tow plugged lightly into the neck of a funnel. All mixtures depositing a sediment should bear the label "*shake the bottle.*"

14. **Mucilages** should be recently prepared, but it can be kept ready made for some time in a completely filled up bottle properly sealed.

15. **Oils** are best emulsified either by rubbing them up with gum, or by mixing them with an alkali, or with both. Copaiba is well emulsified with gum and alkali. Essential oils require either to be mixed with some fixed oils before emulsification or with the yolks of eggs.

16. **Scale preparations** in a mixture are either to be dissolved in a mortar with warm water or poured into the bottle filled with the vehicle, and shaken briskly. If poured in a dry condition into the bottle, and the water or vehicle added afterwards, a sticky mass cakes at the bottom.

17. **Volatile ingredients in a mixture.**—Volatile drugs should never be mixed with hot fluids, and should always be added lastly, after the vehicle has been poured into the bottle, leaving sufficient space for such substances as ammonia, ether, chloroform, diluted hydrocyanic acid, sulphurous acid, &c. Cork quickly and shake well.

MIXTURES AND EMULSIONS OF SPECIAL DRUGS.

Acacia in a mixture is best added in the form of a mucilage, which should be made fresh.

2. **Almond oil** does not emulsify well with mucilage or powdered gum, but a small quantity of liquor potassæ or carbonate of postassium without mucilage answers well.

3. **Ammoniacum, Almond and Gauiacum** should be triturated first with a little water or vehicle so as to form a thin paste, and then gradually mixed with the vehicle.

4. **Ammoniun Carbonate** should be dissolved in a cold vehicle, only translucent pieces being used. Effloresced or powdered salt is weak.

5. **Benzoic Acid** should be powdered before mixing. If there is a tincture in the formula it should be dissolved in it, and water added gradually with a shaking.

6. **Bismuth Oxynitrate** is chemically incompatible with potassium bicarbonate or sodium bicarbonate producing a large quantity of carbonic acid gas when mixed in a mixture. $2BiONO_3 + 2NaHCO_3 = Bi_2O_2CO_3 + 2NaNO_3 + H_2O + CO_2$. The gas must be allowed to escape by gentle heat before bottling. An equivalent quantity of bismuth carbonate can be substituted as the finished mixture contains the same. Bismuth salts and iodides produce bismuth oxyiodide which gives brownish-red color to the mixture, though therapeutically does no harm.

7. **Borax** powdered and rubbed up with mucilage makes a soft jelly-like mass. But a limpid mixture may be obtained by mixing the freely diluted old mucilage with a solution of borax in warm water.

8. **Butyl Chloral Hydrate** forms oily-like compounds with alcohol insoluble in water. Dissolve in glycerin and warm water. Chloral hydrate behaves in the same way, and is decomposed by alkalis liberating chloroform.

9. **Chlorate of Potassium and Hydrochloric Acid.**—Sometimes, a formula composed of Pot. Chloras, Acid. Hydrochloric. and Water comes to the dispenser for dispensing. Here, the object is to make a solution of chlorine, and is best fulfilled by adding the acid directly to the salt, corking the bottle for a while before adding water, so as to make a solution of chlorine in water.

Chlorate of potassium with syrup of iodide of iron liberates *free iodine* which has proved fatal.

10. **Cod-liver Oil** is well emulsified by the following method:—Place powdered tragacanth in a dry mortar and triturate with a little of the oil, then add the yolk of egg and the oil and stir briskly adding water as the mixture thickens, and lastly mix flavouring oils and water alternately with constant stirring avoiding frothing. The mixing of lime water 1 to 5 with cod-liver oil greatly facilitates its emulsification, and reduces its tendency to eructations. Lime water and acacia gum emulsify cod-liver oil just as well as the yolk of egg.

11. **Copaiba Balsam** can be well emulsified by rubbing it with one-third its weight of milk sugar, and about its own weight of powdered gum acacia, adding water gradually. Liqr. potassæ also emulsifies it well.

12. **Ethers** should never be mixed with hot liquids, and must be added last to a mixture.

13. **Ferri Sulph.** soon gives a rusty color to a solution

from the production of ferric hydroxide, which is retarded by adding an acid.

14. **Glycerin** is used as a sweetening agent for mixtures, especially those that contain perchloride of iron. It is also used as an appropriate solvent for and a preservative of the pancreatic and peptic ferments. It prevents gelatinisation of kino in tr. kino, and also to a certain extent prevents and retards chemical changes and precipitation in a mixture.

15. **Iodine** is very sparingly soluble in water, but iodide of potassium would help the solution of three-quarters of its own weight. Salts of ammonia also increase its solubility by the formation of a soluble salt ammonium iodide. Some essential oils, such as, oils of peppermint and fennel chemically combine with iodine. Strong solution of iodine with solution of ammonia, or with ammoniated camphor liniment, precipitates iodide of nitrogen, which is a most dangerous explosive. (see Explosive Combination).

16. **Morphine Salts** should not be dissolved with the aid of heat, for at a temperature above 104° F. their solutions turn yellow or brown.

17. **Phenazone** is sometimes a troublesome drug to deal with in a mixture. It is rather a free base, and gives precipitates with tannin, alkaloids and many other substances. Thus, with alkaline salicylates, it forms *salipyrin* (insoluble) ; with ferric chloride *ferripyrin* (orange-red) ; with free iodine *iodopyrin* (insoluble) ; with chloral hydrate *hypnal* (insoluble), &c.

1 . **Potassium iodide** is decomposed by acids, free or liberated, liberating *free iodine*, which after a while falls down as a sediment, and may prove fatal if taken in that state. This also happens when potassium iodide is mixed with tincture of perchloride of iron.

19. **Quinine Salts.**—The following points in respect of the mixing of a quinine salt should be noted :—

(a) It produces an *insoluble salt* when added to a strong mineral acid ; the acid should be freely diluted with the vehicle before the alkaloidal salt is mixed.

(b) When it is prescribed with spirit of nitrous ether, tinctures, ether, or any spirituous liquids along with glycerin or syrup and water ; the quinine is to be first dissolved in the undiluted spirituous mixture and then glycerin or syrup added, and lastly the vehicle is gradually mixed. If no mucilage is ordered it may be added, to prevent quinine from adhering to the sides of the bottle.

(c) The sulphate should not be dissolved in diluted hydrochloric or nitro-hydrochloric acids if not ordered.

(d) When ordered with bark or any other substances containing tannic acid, it deposits a precipitate of tannate of quinine which should not be filtered.

(e) No acid should be added by the dispenser to make a

solution, if it is not prescribed. The quinine then is to be rubbed up in a mortar with a little mucilage and diffused in water, or added to the vehicle in its crystalline state, with "shake the bottle" as a direction. The former is a better method.

(*f*) Quinine salts are *incompatible with alkalis*, such as, bicarbonates, carbonates, hydrates, spirit. ammon. aromat., &c. They should be suspended and diluted *separately* before mixing ; a small quantity of mucilage will make a better mixture.

(*g*) Ammoniated tincture of quinine gives a precipitate when diluted with water, but the addition of a little mucilage (½ dr. to 1 oz. of mixture) suspends it.

(*h*) With liberated chlorine, quinine salts yield a yellow solution, *i. e.* when added to the chlorine mixture mentioned in para 9, page 81.

(*i*) Mercuric chloride throws down a poisonous precipitate, which can be dissolved by diluted hydrochloric acid. Glycerin and gum also retard to some extent chemical reaction.

(*j*) Donovan's solution too behaves in the same way, but an admixture of glycerin and mucilage prevents to some extent chemical changes.

(*k*) When it is ordered with salicylates in a mixture, an ugly looking mass salicylate of quinine forms within the bottle which refuses to flow out. The mixture may be improved by rubbing mucilage with quinine and gradually mixing the salicylate dissolved in a large quantity of water, and agitating very briskly.

(*l*) Neutral solution of quinine and iodide of potassium do not act chemically, unless there is an acid present, free or liberated, in which case iodine is set free. The only way of getting over the difficulty in a prescription like this, is to refer the matter to the prescriber, failing which, the oxidising body should be mixed first with a minimum quantity of iodide, and the rest of the iodide and quinine being mixed together with a little mucilage, and then iodine solution is added.

(*m*) The growth of fungus in a solution of quinine is prevented by the addition of a 5 per cent solution of alcohol or a trace of chloroform.

(*n*) Soluble salts of Quinine, such as Quininæ Hydrobomidum Acidum, Quininæ Hydrochloridum Acidum, Quininæ Albuminas, Quininæ Hydrochlorosulphas, Quininæ Hydrochlorophosphas, Quininæ Lactas, &c. can be dispensed without the addition of acids, as they are soluble in water.

20. **Spirit of Nitrous Ether** soon turns *acid* from decomposition, and should therefore be made *alkaline* before being mixed with iodides or bromides, otherwise free iodine or bromine will be liberated and will darken the mixture It can be kept permanently alkaline or neutral by dropping a few crystals of pot. bicarb. in it.

21. **Strychnine** in a mixture containing alkalis is precipita-

ted to the bottom of the vial and may produce fatal results from swallowing the insoluble salt. Bromide and iodide of potassium, liq. hydr. percloridi and liq. sodii arsenat. all throw down insoluble precipitates of strychnine compounds.

22. **Tannic acid** should be dissolved in pure distilled water, as tap water makes the solution opalescent. It precipitates alkaloids in solution and gives with iron an inky color. Alkalis give precipitates, and turn the mixture brown to black. Mucilage makes it flaky.

23. **Terebene and Turpentine** are better emulsified with the yolk of egg. At least one egg is required for each ounce of the oil of turpentine. Thick mucilage and tr. quillaiæ answer too, but not so well as the yolk. According to Forbes essential oils can be emulsified by shaking them with powdered gum acacia (20 grs. to 10 ozs.) in a dry bottle, and then adding water (½ to 1) with brisk agitation.

24. **Vegetable extracts** should be carefully *rubbed* in a warm mortar with a little water till a soft paste is obtained, with which the vehicle is to be gradually mixed. If they are resinous rub them with two or three times of their weight of powdered acacia in warm water, and then gradually mix with the vehicle when cold. *Ext. Filicis Liquid* can be triturated with powdered acacia, soap or milk.

PILLS.

1. **In making a pill-mass**, the following points should be observed :—

(*a*) "Put the substance (powder) prescribed in smallest quantity into the mortar first, and triturate it with the next smallest (if it is powder), add the next, again triturate, and so on.

(*b*) Toxic substances (*e. g.*, alkaloids and arsenic) should always be triturated well with double their weight of a hard powder (*e.g.*, sacch. lactis), if there is none in the pill constituents, before adding the other ingredients gradually

(*c*) Potent extracts which are prescribed in the pill should not be treated as excipients—*e.g.* extr. nucis vom. gr. ⅛ with pulv. aloes gr. ij and pulv. ipecac. gr. ss. Here rub the extract with the ipecacuanha, add a little of the aloes, again triturate, and continue thus until the extract is equally divided throughout the whole.

(*d*) Essential oils should be treated like No. (c). Thus, in the case of pil. aloes socot., the oil of nutmeg should be triturated lightly with the powdered soap (the oil being added gradually), then aloes, trituration, aloes, trituration, &c." *

---

* Chemists' and Druggists' Diary, 1898.

2. **The official pill-masses** :—The following can more conveniently and usefully be kept in powder, *viz* :—Extr. Colocynth. Co., Extr. Rhei, Pil. Aloes et Ferri, Pil. Aloes et Myrrh, Pil. Aloes et Asafetida, Pil. Cambog. Co., Pil. Colocynth. Co., Pil. Hydrarg. Subchlorid. Co., &c., noting on the label of each, the quantity of the powder that is equivalent to the pill-mass Thus, Pulv. pro-Aloes et Asafetida gr. iv = 5 grs. Pil. Aloes et Asafetida.

3. **Pills under one grain** should be dispensed in 1 gr. gross weight each. Liqourice powder or sugar of milk is added to increase their weight. Fractions of a grain of such **powerful drugs,** as strychnine, perchloride of mercury, sulphide of calcium, arsenic, &c. should be intimately triturated with crystallised sugar of milk, and then made into a pill-mass with soft manna, or other suitable excipients.

4. **Pills liable to crumble** will keep their shape for a reasonable time, if some fibrous materials, such as liquorice powder, paper pulp or lycopodium are added to the mass. If the pill-mass is too soft, it should be hardened on a hot plate, but if the ingredients are hard and brittle, such as pitch, chian turpentine, &c., they should be massed in a warm mortar. When the pill-mass contains dry vegetable powders, some minutes must be allowed to absorb moisture before rolling.

5. **The same spatula** should never be used to scrape the pill-mass from the tile, pestle and mortar, and again to dip it into the extract pot.

6. **To prevent sticking together,** cinnamon or liquorice powder, mixture of starches, powdered French chalk are used. Pills containing hygroscopic and volatile ingredients should better be varnished or coated and then dispensed in a well stoppered or corked bottle. Pills for silvering should never contain glycerin.

7. **Substances that are decomposed by Iron,** such as silver nitrate, copper and bismuth salts, corrosive sublimate, calomel ought not to be mixed in an iron mortar, or scraped by an iron spatula.

8. **Crystalline salts** soluble in water, should be very finely powdered, and massed with theriacanth and some inert powder. Before silvering, they must be varnished with tolu and dried. Glycerin of tragacanth is the best excipient for insoluble salts.

9. **Essential oils.**—Soap or sometimes soap and powdered liquorice root make a good excipient. Wax is to be avoided if possible. With resinous powders they should be triturated first, then the remaining ingredients, if any, added and triturated ; adding liquorice powder if too soft, and spirit if too hard. When there is much essential oil, the addition of liquor potassæ helps greatly. Sometimes the essential oil itself contained in the formula can be used as an excipient.

EXCIPIENTS.

1. **Acacia** in powder is not a good excipient, though used frequently. Mucilage of acacia makes the pills too hard if not used soon. With calomel it forms a regular cement.

2. **Bread Crumb** has fallen into disfavour. When mica panis is ordered, use wheaten flour and water *q.s.*

3. **Calcium Phosphate** in minute quantities gives a pilular consistence to greesy substances and essential oils.

4. **Castor Oil** with or without soap is a good excipient for making camphor pills.

5. **Confection of Roses and Hips** are not used now, because they increase the bulk of pills.

6. **Compound Decoction of Aloes** in minute quantities is a good excipient for pills containing aloes and gum resins. It should not be used in cases where there is an incompatibility with carbonate of potassium which it contains.

7. **Extract of Malt** is a good general excipient.

8. **Glycerin** keeps pills soft, but it is very hygroscopic. The addition of one-third of its weight of water overcomes its hygroscopic property.

9. **Glycerin, Mucilage of Acacia, Water and Alcohol** in equal parts make a good general excipient.

10. **Glucanth** as prepared by Lucas, consists of powdered tragacanth ½ oz , glycerin 1½ ozs , water ½ oz., syrup of glucose 3½ ozs. It is useful where glycerin of tragacanth is unsuitable on account of the large quantity of glycerin.

11. **Glucose Syrup** is a serviceable excipient.

12. **Honey and Treacle** do not make the pills hard, and are at times used in preference to mucilage, &c.

13. **Kaolin** is useful for massing oxidisable and reducible ingredients, as potassium permanganate.

14. **Kieselguhr** (fossil earth) absorbs liquids (1 gr. = 1 m.). The mixture can be massed by glucanth.

15. **Liquorice and Marshmallow** in powder are absorbent and give elasticity to the soft mass.

16. **Manna** can be used for massing calomel, quinine, and bismuth salts.

17. **Proctor's Paste** consists of pulv. tragacanth 1 dr., glycerin 3 drs. and water 1⅓ dr. The paste improves by keeping. The B.P. Glycerinum Tragacanthæ can be used as a substitute. It is an all-round good excipient.

18. **Resin Ointment** is used for scale preparations.

19. **Soap Powder** is the best excipient for vegetable powders, extracts and gum resins. It does neither get hard nor crumble. It should not be used for masses containing acids, acid salts, metallic salts and substances containing tannin.

20. **Syrup** alone is rarely used but makes an useful excipient with powdered althea.

21. **Spirit** softens resinous substances, but the mass should be soon rolled, otherwise it would crumble.

22. **Theriacanth** is an admirable excipient for intractable drugs, as reduced iron, phosphate of iron. It is made by rubbing pulv. tragacanth. 1 dr. with rectified spirit 2 drs. and mixing quickly with warm treacle 2 ozs.

23. **Tincture of Gentian and Treacle** in equal parts make a good excipient giving firmness, toughness and solubility. It is recommended by Dr. Whitla for massing quinine.

24. **Tragacanth** powder gives in small quantities solidity and elasticity to a soft mass, more so, when the compound powder is used.

25. **Water** should be carefully used as an excipient. It is a good excipient for masses containing gum or soap. Water makes a good pill with powdered opium

26. **Wax** is not much used now. for it makes pills indigestible, though it makes a beautiful pill-mass with camphor, creasote, carbolic acid and most of the essential oils. Cacao butter makes a good mass with silver oxide.

27. **Ince's Precautions**.—The excipients to be avoided are—(*a*) "Those incompatible with any of the ingredients of the pill-mass. Thus, confection of roses must not be used to make up iron compounds ; acetic extract of colchicum must not be stiffened with magnesia. (*b*) Those which make the pill either too hard or too soft. (*c*) Those which unduly increase size."

PILLS OF SPECIAL DRUGS.

1. **Acids.**—Mineral acids are rarely used in pills, but the addition of powdered marsh mallow and glycerinated water make a good pill-mass.

2. **Aloes** is best made into pills, with a minute quantity of compound decoction of aloes, which has a great solvent power, or with proof spirit. **Aloin** is massed with glycerin of tragacanth.

3. **Antipyrin** makes a good pill with tragacanth or glucanth.

4. **Argenti Nitras and Argenti Oxidum**.—The former is triturated with kaolin and massed with paraffin ointment, and the latter with kaolin ointment.

5. **Bismuth Salts** are best made into pills with Proctor's paste or manna.

6. **Butyl Chloral Hydrate** makes a good pill-mass with equal parts powdered acacia, tragacanth and syrup.

7. **Calcium Sulphide** should be triturated with ½ gr. of sugar of milk for each pill, and massed with powdered tragacanth and glycerin. Each pill should be of 1 gr. gross weight.

8. **Calomel** with manna makes a good pill.

9. **Camphor** should be powdered first with a few drops of alcohol, and after the evaporation of the spirit, Proctor's paste is to be added. Some like soap and fixed oil.

10. **Camphor Monobromata** should be triturated with pulv. tragac. co. and massed with Proctor's paste.

11. **Carbolic Acid** (crystallised) is massed with wheaten flour, powdered soap and liquorice, powdered marsh-mallow with a minute quantity of Proctor's paste.

12. **Citrate of Iron and Quinine** can be made into a pill by the addition of proof and rectified spirit and rolling the mass quickly. Resin ointment can be used also.

13. **Codeine** can be massed with half its weight of powdered liquorice and glycerin of tragacanth.

14. **Copaiba** makes a very hard pill with a small quantity of carbonate of magnesia, insoluble in the intestinal secretions. By making a gum-emulsion of the balsam, and then setting aside for 12 hours, after adding 1 part of mag. levis to every 10 parts of balsam, the emulsion turns out to be a good pill-mass by the addition of a minute quantity of borax. A pill made from such a mass is soluble. Phosphate of calcium also makes a good pill.

15. **Creasote** with powdered curd soap B.P. and powdered liquorice make a good mass. The following method is recommeded by Martindale :—"Put the creasote in a wide mouth, stoppered bottle, add the soap, and mix well. Then digest in a water-bath till they combine." **Guaiacol** should be treated like creasote.

16. **Croton oil** forms a good pill-mass with wheaten flour, mucilage and liquorice powder, and powdered curd soap with a little glycerin of tragacanth.

17. **Ergotin** makes a good pill with powdered althea or any inert vegetable powder, and sometimes with a minute quantity tragacanth. It must be hardened if too soft by evaporation.

18. **Ferri Sulphas.**—The granular sulphate forms a good pill with glycerin of tragacanth and a little powdered sugar of milk. **Ferri sulph. exsiccat.** does not make a good pill. It cracks after a while. However, the following method would do :—The iron salt is to be triturated with equal parts of powdered acacia and tragacanth and massed with a mixture of glycerin 1, and water 2.

19. **Ferrum Redactum** makes a good pill, when rubbed down to a fine powder, powdered liquorice added, and massed with liquid glucose or glycerin of tragacanth. Theriacanth makes an excellent excipient. Extracts may swell the pills from the production of hydrogen, if they turn acid.

20. **Gallic Acid** makes a good pill-mass with glycerin.

21. **Hydrargyrum c. Creta** can be massed with glycerin of tragacanth. It should never be vigorously triturated in a mortar, as mercury may separate.

22. **Hydrargyri Perchloridi** should be finely triturated with sugar of milk and other ingredients, if any, and made into a pill with glycerin of tragacanth. Glycerin dissolves the salt and can be used as an excipient.

23. **Hydrargyri Subchloridi** makes a good pill with manna.

24. **Menthol** should be worked like carbolic acid. If it liquefies during manipulation, add kieselguhr.

25. **Pepsin** can be massed with a mixture of equal parts of glycerin, syrup and water by quick rolling. 1 m. of diluted hydrochloric acid and 5 grs. of pepsin can be rolled into a pill.

26. **Phosphorus** can be made into pills by three methods :—

(*a*) *Solution by Carbon Bisulphide* :—Phosphorus is first dissolved in bisulphide of carbon, and while the solution is going on, pour two or three drops of chloroform, which gives rise to a thick vapour around the solution, and thus prevents ignition. A little powdered liquorice is now added and a workable mass is made by the addition of a little Proctor's paste. (*b*) *Sotution by Oil* :—Phosphorus is melted in hot mutton suet or oil of theobroma, in a wide mouthed bottle with an indiarubber cork, by good shaking till the fat solidifies. Then add liquorice powder and make a plastic mass. (*c*) *Combined method* or the *B.P. Process* :—In this, phosphorus is dissolved in carbon bisulphide and the solution is carefully mixed with melted lard and beeswax, and made into a pill-mass with the addition of a little kaolin. The last method is better suited for India. The mass must be kept immersed in cold water in a blue bottle away from light. 3 grs. of the mass and 1 gr. of acacia powder can be rolled into a pill for dispensing.

Pills containing phosphorus require varnishing or a pearl coating.

27. **Potassiam Acetate** is rarely used as a pill. Canada balsam makes a fair mass, but boro-tartrate of potash a scale compound makes a better one.

28. **Potassium Iodide** must first be rubbed up with a little water, so as to make a thick paste, before liquorice powder is added.

29. **Potassium Permanganate** requiries a careful treatment, for it soon oxidises when brought in contact with organic matter, such as, sugar, syrup, glycerin, vegetable extracts, &c. It can be made into a good pill-mass by mixing it with kaolin and a little water, or with Martindale's *kaolin ointment* which consists of equal parts of vaseline, paraffin and kaolin.

30. **Quinine Sulphate** with tartaric or citric acid makes an excellent mass. Sometimes a drop or two of glycerin or water may be necessary in dry weather. They must be varnished or capsuled, otherwise they would become soft and sticky by damp. Glycerin of tragacanth, manna and strong sulphuric acid (1 drop to 4 grs.) are also good excipients. White excipients should be used for white drugs.

31. **Rhubarb Powder** is a troublesome substance for pill-making. Proof spirit or tincture of rhubarb (1 m. to 3 grs.) makes a soft mass which should be rolled quickly. Simple syrup, treacle and equal parts of glycerin and rectified spirit can also be used.

32. **Salol** can be made into a pill with glucanth.

33. **Sodium Bicarbonate** is sometimes given in a pill. A fair mass can be obtained by mixing dry bicarbonate with powdered liquorice or ginger and mucilage.

34. **Taraxacum Extract** causes fermentation and thereby swelling of pills. It should be mixed with powdered tragacanth after evaporation. Pills should stand for half an hour before silvering.

35. **Zinc Valerianate** makes a good mass with a little powdered acacia and spirit. Glycerin of tragacanth and liquorice powder may answer well.

PILL COATING.

The coating of pills is of a recent introduction in elegant pharmacy. Though the coating is done on a large scale by machinery with great finish, yet the dispenser must learn the art sufficiently well to enable him to do it on a small scale, on the counter. Gilding or silvering is getting out of date, and is giving place to *varnishing*, *pearl-coating*, *sugar-coating*, *gelatin-coating*, &c. But, the dispenser is yet at times called upon to silver pills, for which he must possess that amount of skill, which his predecessors did.

1. **The general rule** in the coating of pills is that *all pills requiring a coating, should be perfectly made, of a firm consistence, and free from contamination and powder.*

2. **Silvering** is done in a globular covered earthen-ware pot or a box wood pill-silverer. The pills being damped with thin mucilage are either dropped over a silver leaf put within the silverer, or over a leaf as it lies flat in the book, and the pills and the leaf being quickly slided into the silverer. The cover is put on and the silverer is rotated in the air over a minute. After the superfluous fragments have been blown off, the pills are exposed to air for a few minutes to dry. One silver leaf covers six 5 grain pills, and two drops of mucilage are enough to damp a dozen of such pills. If the pills are too damp, more leaf is required for silvering, moreover the finish is not so elegant. A better and finer silvering can be obtained by putting the pills and leaf in a covered porcelain pot or a metallic silverer, heating the pot or silverer over a spirit lamp and rotating it as before.

Pills containing asafetida and sulphides should not be silvered unless they are very *stiff* and *varnished*, otherwise the silvering would get soon blackened. Pills containing mercury produce an unsightly amalgam.

3. **Varnishing** can be done either by a solution made by dissolving 1 of residues of tolu syrup in 3 of pure chloroform or ether, or by a solution (Martindale's) containing equal parts of sandarach and absolute alcohol. The pills being put in a

covered pot, a few drops of the varnishing fluid sufficient to wet all are poured over them, and the pot rotated as in silvering. They are then transferred to a developing dish, separated from one another, and occasionally rotated until the coating dries and becomes hard The chloroform or ether solution dries very soon.

4. **Gelatin-Coating.**—A coating solution is made by dissolving 1 of gelatin in 4 of water on a water-bath, straining while hot, and cooling it afterwards. If there are air bubbles, the solution should be reheated. The general rule having been observed, pills are stuck on the points of pins or needles and dipped into a warm solution. The needles are taken out slowly and rotated for a few seconds, and then stuck into a sheet of cork or pin-cushion by their opposite ends. As soon as the outside coating dries, the needles are withdrawn, and holes close themselves by the oozing of the inner layer of soft coating.

5. **Pearl-Coating** is very popular now. For a perfect and elegant coating, pills must be completely dry, which can be easily accomplished by keeping them in a sulphuric acid drier. If they contain any hygroscopic substances, they should be varnished before coating. Generally two kinds of solution are used ;—(*a*) one which contains mucilage 1 dr., syrup 1 dr. and water to 1 oz. ; and (*b*) another (martindale's) which contains syrup $\frac{1}{2}$ dr., tragacanth 4 grs. and water to 1 oz. A few drops of either of these are poured over pills in a covered globe or pill-coater, which is rotated inorder to damp them, as well as to moisten the inside surface of the globe. Exceedingly fine, powdered French chalk, which can be improved by adding 3 p. c of mag. carb. levis inorder to help their solubility in the gastric juice, is dusted over pills from time to time as the rotation is continued, until the coating is uniform. Pills are then transferred to a second clean globe and rotated rapidly until they are polished. If a high polish is desired, the burnished pills can be rotated in a third warmed globe having a thin coating of had paraffin or white beeswax.

6. **Sugar-Coating** is rather a complicated process. Dr. Symes however recommends the following as the best successful practical method :—"Pills well dried on the surface are placed in a tinned copper bowl with a flat bottom, or an enamelled iron dish, the surface of which has been moistened with syrup, or syrup and gum. They are then rotated and gently heated, very finely powdered sugar being dusted on, and the motion kept up till a perfectly dry, hard, and whitish coating is obtained, the operation being repeated if necessary." The first attempt may not succeed, but the practice is sure to win.

7. **Keratin-Coating.**—Keratin solution is made by first removing from horn shavings all that is soluble in pepsin and diluted hydrochloric acid, dissolving the residue in alcoholic solution of ammonia or acetic acid, and then evaporating the solution

to the consistence of a liquid gum. The pills are simply rotated with this solution in a pot and dried on a slab. The coating often gets sticky. Pepsinized keratin can be bought and dissolved in any of the above solvents. Drugs intended to be dissolved in the intestine are coated with keratin or salol ; as carbolic acid.

8. **Salol-Varnishing.**—The varnish contains salol 2, shellac 3, absolute alcohol and ether of each 3, and should be applied several times till a thick coating is obtained. Or salol can be melted by heat in a copper bowl and pills rotated as in sugar-coating.

9 **Concentric Coating** is an ingenious process by which a coated pilule containing an active drug is covered with a second drug, which after being coated is again covered with a third, and so on. Incompatibles can be made into pills by this process.

POWDERS.

1. **Compound Powders.**—The B.P. gives no directions as to the manner of mixing compound powders, consequently the dispenser is left to his own experience and resources in compounding them. The following hints, however, will greatly help him.

(*a*) **Powders must be thoroughly mixed** in a mortar or on paper. Powders mixed by a spatula on paper and sifted are more diffusible in water, than those rubbed up in a mortar ; but there are exceptions to this rule. Take for example the following prescription; —℞ Sulph. Precipit. gr. xx, Guaiaci Resin gr. x, Magnesia gr. xx. Here the most miscible powder is obtained by triturating guaiacum and magnesia together in a mortar, before adding sulphur, whereas if mixed on paper, it would not diffuse in water. Powders for insufflation should never be triturated in a mortar, but only loosely mixed on paper.

(*b*) They should be **passed and repassed through a fine hair sieve** as often as could be done. By repeated sifting and shaking in a bottle, the ingredients are thoroughly incorporated and a uniformity of color is obtained.

(*c*) They should be **very lightly rubbed** in a mortar, if this process is at all adopted, otherwise they would cake.

(*d*) **Ingredients in smaller quantities** should first be thoroughly mixed together, and afterwards larger quantities be gradually incorporated.

2. **Folding Paper and Boxes.**—Powders should be folded in ordinary writing paper, or better if possible, in demy, glazed powder-paper made for the purpose Waxed or paraffined paper is to be used for hygroscopic drugs. Coloured paper is used for powders for lotions. Folded powders should be of the same breadth and length, better done on a powder-folder. Powders under six are generally dispensed in a neat small oblong enevelope

on which "The Powder" is printed ; but those over six in a card board box or bottle with a label gummed outside.

3. **Waxed Paper and Tinfoil.**—Drugs that are **perishable**, as ergot ; that are **volatile**, as camphor, essential oils ; that are **hygroscopic**, as potassium acetate, carbonate and citrate, and sodium iodide, &c. ; that are liable to **decomposition**, as calcium sulphide, valerianates ; should be folded first in waxed paper, and then each covered with tinfoil, and dispensed in a bottle.

4. **Powders in quantity.**—When a powder is ordered to be given in spoonfuls, it should be dispensed in a well-corked or stoppered, wide mouthed bottle.

5. **Salts** which mutually decompose each other must be mixed and stirred lightly together in a dry condition ; as sodium sulphate with potassium tartrate, potassium nitrate with sodium salicylate, &c.

6. **Oxidising Substances** should be each separately rubbed to powder, and then be lightly blended on paper with safe ingredients by a bone spatula. (See Explosive Combinations)

7. **Hygroscopic Powdered Drugs** should never be kept in paper packets. They should be dried and preserved in wide mouthed bottles or stone jars with accurately fitted stoppers or corks. Suspending a bag of dry quick lime from the cork, helps also to keep powders dry. Powdered squill and ammoniacum can be kept dry in this way.

8. **Removal of Identity.**—Crystalline salts, as potassium bromide ; roots, as ipecacuanha ; leaves, as dligitalis ; barks, as cinchona, &c., should be finely pulverised before admixture.

9. **Division of Powders.**—There should be no guess work in division. **Each one must be weighed.** Many failures in examination are due to inattention to this simple procedure.

10. **Liquids** are rarely prescribed in powders, if so, white kieselguhr may be used to absorb them (1 gr. to 1 m.)

BLISTERS.

1. **Blister Spreading** :—A blister is better spread over an adhesive plaster, which has been previously spread upon glazed thin calico First of all the dispenser should cut a "shape"—an exact size and form of the blister ordered—out of a square piece of writing or packing paper, leaving all round a margin 1 inch wide. This is best done by folding the square piece twice upon itself, and cutting by a pair of scissors the shape of the blister out of the middle, rejecting the cut out central piece. This *empty space is the shape of the blister*. The dispenser now cuts a piece of spread adhesive plaster or adhesive plaster-mull one inch bigger than the size ordered, and gently warms it to make it slightly sticky, and

quickly lays the "shape" upon its sticky surface, and evenly presses it over. (In India the warming of the adhesive plaster is not often necessary during hot months) He then takes a quantity of the B.P. cantharides plaster sufficient for the size and softens it well between his thumb and fingers. Taking a small pellet, he spreads over the adhesive surface, with the side and front of his right thumb, while the fingers of his left hand keep the plaster *in situ*. He goes on making a series of rainbow-like strokes from left to right till the whole of the surface within the shape is covered. A long spatula not unlike a large dinner knife is gently warmed, and firmly passed over the spread cantharides, removing any superfluous plaster and making its surface smooth. The paper shape is now removed, and the edges are neatly trimmed, keeping a margin of the plaster three-eighth of an inch wide. A piece of oiled or waxed paper is now loosely laid over the blister and the whole put within a paper box.

2. **Powdered Cantharides, Blistering Liquid** or **Olive Oil** should not be sprinkled or applied to increase the action or improve the appearance of the blister.

3. **Paper-Covering** should be removed before use, otherwise the blister would not stick. Both the dispenser and prescriber should give directions to this effect. A better plan is to pin the margins to a piece of paper and to stick that paper to the bottom of the box.

PLASTERS.

Most of the plaster-mulls of the market are made by machinery. Dispensing of such a spread plaster means the cutting of a piece ordered. It is only when a special or a mixture of plasters is ordered, the dispenser is then required to make one on the counter. The spreading of a plaster requires great skill and dexterity.

1. **Plaster spreading.**—A plaster is made in the same manner as a blister, except that the method of spreading is different. Sheepskin, stiff chamois. dimity, moleskin or sometimes adhesive plaster-mull is used, but the white sheepskin is generally preferred when not otherwise ordered by the prescriber. The "shape" is cut in the same way as for a blister. A piece of leather larger than the size of the plaster ordered, is cut off, and stretched out in all directions by pulling. The leather is now placed with its rough surface upwards on a thick pad of paper, and the gently warmed plaster iron is passed over it, to remove any wrinkles or inequalities. The paper shape merely dipped in water is evenly pressed against this rough surface, and other things for spreading being ready in the mean time, the process of spreading

is begun, which can be accomplished by any of the following methods :—

(*a*) **Old Method.**—Two plaster irons are to be heated. First take one of them out of fire and briskly rub it against some wood, or old gunny cloth to remove any particles of carbon adhering to the surface. Press it with a gentle rotatory motion against the roll of the plaster, held by the left hand, when the melted plaster will drop upon a piece of strong, smooth paper spread for the purpose. If two or more plasters are ordered in combination, they can be melted together in the same way against the face of the plaster iron, and the melted mass mixed thoroughly with the sharp edge of the iron on the paper. The creamy mass thus made is now scraped from the centre of the paper to near its margin, and the leather is brought alongside of it, when with a few strokes of the edge and adjoining part of the face of the iron, the plaster is spread over the surface of the leather ; commencing from left to right, watching the borders and corners, for the centre will take care of itself. When the leather is well covered, the flat face of the iron is passed over it, to smooth irregularities.

The heat of one iron may not finish the whole process, unless it has a gas jet burning in its interior. The second iron is required at the time when the plaster is transferred from the paper to the leather. When the plaster has thoroughly settled, the shape is pulled off and borders trimmed.

(*b*) **Modern Method.**—The plaster is cut into thin slices put in a small enamelled pan with a lip and handle, and warmed over a gas flame or fire, stirring it constantly from the first and not allowing it to boil. In the meantime, the leather, the shape, and the plaster iron or spatula are kept ready as described before. As soon as the plaster becomes creamy, it is poured over the leather within the shape at the left end, and with a long spatula or plaster iron it is spread rapidly over the surface as before, lifting up any superfluous plaster and returning it to the pot.

(*c*) **The Writer's Method.**—The easiest and most convenient method of spreading is to cut a piece of plaster from the stick, about 15 grs. per square inch, and to put it over a piece of smooth or glazed strong brown paper. Having kept the shape and the leather ready, melt the piece to a creamy consistence by gently rubbing a hot plaster iron over the peice on the paper, and scrape the mass to its edge. The leather with the shape, having been brought alongside, with one or two sweeps the dispenser covers the whole surface, removing any superfluous plaster with a spatula. A second hot iron may be required during spreading.

A mixture of plasters can be made by a similar process, the peices of plasters ordered in a prescription, being melted and mixed together on the paper before spreading.

2. **Plaster with an Adhesive Margin** is made in the

following manner :—The shape is cut as before, and the central piece instead of being thrown away, is damped and stuck to the middle of the leather. The shape is again folded up, and a peice of the width of the intended adhesive margin is cut off ; and the shape is pressed against the leather, thus keeping a free space between the centre-piece and the shape ; which space is now covered over with the adhesive plaster. When cold remove both the papers, and put on the right shape coated thinly with soft soap, covering the adhesive margin. Now spread the prescribed plaster rapidly, as if there is no adhesive margin. After removal of the shape, any soap adhering to the adhesive plaster must be wiped off by a wet cloth or sponge. Some expert dispensers can cover the central part without a shape. It is not unusual to leave a non-adhesive margin outside the adhesive one.

The Writer's Method.—The plaster is spread as usual and the shape is pulled off, and the margin of the leather is trimmed, leaving exactly the width to be covered over with the adhesive plaster. The dispenser now melts a small piece of adhesive plaster, in a gallipot, and with a spatula spreads it over the margin and finally smooths it by passing a hot spatula over. The advantage over the other methods is its simplicity, for it is more easy to cover the margin last, than to cover the central part after the margin has been covered.

3. **Plasters for bed sores** are spread on chamois leather without margins.

4. **Mammary plasters** must be round, 7 in. in diameter, with an opening 1 in. in diameter in the centre. In order to fit them to the curved surface of the breasts, a piece should be cut off commencing at the hole and gradually widening about an inch towards the circumference.

SUPPOSITORIES, PESSARIES AND BOUGIES.

1. **Basis.**—Oil of theobroma is the *official basis*. It should be liquefied on a water-bath in a casserole or a porcelain evaporating dish. In India and the colonies, according to prevailing temperatures, white beeswax, more or less, can be added for solidification, for an equivalent quantity of the cacao butter under the directions of the B.P. *Gelatin basis* (Squire's) is made by soaking gelatin 1 oz. in water 1 oz. until absorbed, and then dissolving in glycerin 3½ ozs. on a water-bath. This can be kept ready-made covered by a layer of alcohol in a wide mouthed bottle. The relative proportions can be altered according to the nature of medicaments. Gelatin basis is used for making nasal bougies, uterine pessaries and suppositories.

2. **Ingredients** should be treated like those on ointment. Any powder or crystalline substance must be rubbed very fine

with a little cacao butter, before mixing with the melted oil of theobroma.

3. **Moulds** must be perfectly clean and cooled with ice or cold water, and the inside surface wiped with a bit of rag or lint soaked with soap liniment. Wiping with almond oil is necessary for gelatin suppositories.

4. **Operation.**—Triturate as in para 2, and mix with the melted oil of theobroma with constant stirring, until a creamy mass without lumps is obtained, and then pour it into the moulds, or divide into equal parts when hard, and mould them into the shapes of suppositories, pessaries and bougies by fingers. Finely powdered starch prevents sticking during manipulation.

SUPPOSITORIES AND BOUGIES OF SPECIAL DRUGS.

1. **Alkaloids.**—Alkaloidal salts are generally better absorbed than pure alkaloids, and therefore the salts instead of the alkaloids should be used dissolved in oleic acid.

2. **Aristol** makes very good bougies with cacao butter by the cold process.

3. **Boric Acid** makes a good mass, if glycer. acid. boric. B.P. and gelatin basis are mixed together.

4. **Chloral Hydrate** should not be mixed with heated cacao butter, but rubbed up with cold cacao butter and a little wax, if necessary, and pressed into the mould.

5. **Extracts** must be made into a smooth paste with water or proof spirit, and gradually mixed with the melted basis. **Ergotin** must be treated similarly.

6. **Hamamelis** suppositories are made of liquid extract of hamamelis evaporated to one-half, (5 ms for each). Hamamelin or hamamelidin too (1 to 3 grs.) with cacao butter makes a good suppository.

7. **Ichthyol** should not be worked up with gelatin basis which makes it insoluble.

8. **Iodoform** makes good bougies and suppositories with cacao butter by the cold process.

9. **Despatching.**—These preparations should be sent out enclosed within absorbent cotton wool. In hot weather, they may be dispensed in a wide mouth stoppered bottle containing iced water. If they contain volatile ingredients, each of them should be covered with waxed paper or tinfoil.

SYRUPS.

1. **Ingredients.**—Refined or unfaced cane sugar and distilled water should alone be used in the preparation of syrups. If

any scum rises during boiling, it should be skimmed off. The quantities must be exact, otherwise either crystallisation or fermentation may occur.

2. **Straining.**—Syrups are to be strained through a felt-bag, and carefully stored away in well stoppered or corked bottles in dark.

3. **Fermentation.**—Care should be taken that they do not get an admixture of water or other fluids, because they would ferment and decompose.

4. **Syrups containing organic fluids** like the majority of the B.P ones, keep better and longer if they are despumated. **Concentrated liquors** of assured strengths can be used for some organic syrups that are liable to decompose on keeping.

5. **Syrup Ferri Iodide** requires boiling, so as to convert a portion of the sugar into glucose, with a view to preserve ferrous iodide in its pristine condition ; but pharmacists generally fail to do so. It is now therefore largely prepared from the **liquor,** which keeps bright and without oxidation indefinitely by the addition of a trace of hypophosphorous acid.

6. **Syrup Ferri Phosphatis** darkens by keeping but can be extemporaneously prepared from a concentrated solution of iron in phosphoric acid, by addition of simple syrup.

7, **Easton's Syrup** darkens also by keeping, but a clear syrup can be made any time by mixing 1 of liquor ferri phosph. with 7 of syrup containing other ingredients.

TINCTURES.

In the preparation of tinctures, three things are essential, *viz*,—(1) the **Solvent**, (2) the **Process**, and (3) the **Ingredient**.

1. **Solvent.**—The new B.P. has dispensed with the use of rectified and proof spirits, and in their stead has sanctioned alcohols of various strengths, making absolute alcohol as the standard unit (see p. 51), which should be tested before dilution.

(*a*) **Alcohols of higher strengths** are used (1) for the *abstraction of alkaloidal principles*, as of aconite, strophanthus, &c. ; (2) for the *solution of resinous substances*, as asafetida, benzoin, myrrh, Indian hemp, &c. ; (3) for the *solution of volatile oils*, as cubebs, lavender, orange-peel, &c. ; and (4) for the *solution of inorganic substances*, as chloroform, iodine, ferric chloride.

(*b*) **Ammonia along with alcohol** is used in the preparation of ammoniated tinctures of ergot, guaiacum, opium, quinine and valerian.

(*c*) **Spiritus Ætheris** is the menstruum for tr. lobeliæ ætherea.

(*d*) **Tr. Aurantii** is for tr. quininæ.

(*e*) **Glycerin, Chlorform and Distilled Water** are used for dissolving gummy, juicy, resinous, extractive, saline, metallic, non-metallic and alkaloidal drugs.

2. **Process**.—Any of the following processes is used for making tinctures.

(*a*) **Solution**.—Water is the principal solvent. Next to it is alcohol. The necessary conditions for promoting a perfect solution are :—

(1) The **Solute** should, if possible, be comminuted to allow a large area for action by the solvent.

(2) **Agitation** must be continued, or the solvent passed and repassed through the solute, or the solute suspended in the solvent.

(3) **Heat** should, if necessary, be applied to expedite the solution.

(4) **Stirring** is necessary for dissolving a solid. Glass mortars should not be used as they may crack, if not annealed, from increase and decrease of temperature.

(*b*) **Maceration** is not considered as suitable or economical as percolation is, because it requires 7 days' operation. But, if the ingredients are uniformly comminuted and soaked in the menstruum with frequent shaking, an efficient tincture can be obtained after 5 days. The B.P. process is to strain the tincture, press the marc, mix the strained and expressed fluids, filter, and add more menstruum to bring up the tincture to the prescribed volume.

(*c*) **Percolation**.—Moisten the ingredients with the prescribed amount of the menstruum and set aside for 24 hours. Pack the mixture in a percolator and pour gradually the menstruum over the mixture, maintaing a layer of liquid on the top, until three-fourths of the volume are used, or the exhaustion of materials is effected. Press the marc, filter the expressed liquid and mix with the percolate. Enough menstruum is then added to make up the prescribed volume.

A good percolation depends upon thorough soaking, depth and uniformity of packing, and slow passage of the liquid.

(*d*) **Repercolation** is the process by which the product of the first percolation of a drug is used as the menstruum for percolating a second portion of the same drug, and the product of the second portion for percolating a third portion of the same, and so on, as many times as may be desired. This process is not used in the preparation of tinctures. Only ext. belladon. liquid is prepared in this way.

3. **Ingredients**.—These require to be carefully selected. Most of them are to be **powdered** according to the degree of comminution as prescribed by the B.P. (see p. 52-3). Some are to be **cut small**, some to be **bruised**, and some are used as they are.

LOZENGES.

1. **The B.P. lozenges** are made like a pill-mass. Confectioners rarely use powdered gum acacia, though the B.P. directs the use of both the powder and mucilage.

2. **Ingredients**.—The essential ingredients for making lozenges are finely powdered or icing sugar, mucilage of picked gum arabic, and medicinal and flavouring agents.

3. **Operation**.—After the ingredients are mixed and kneaded like a baker's dough, the lozenge-paste is rolled by a rolling-pin

on a slab with sides so adjusted as to maintain a height equal to the thickness of the lozenges desired, and cut out with a punch. The lozenges are then spread out on trays, and after 12 to 24 hours, they are removed with the trays to a hot chamber to dry.

4. **Stamping.**—While the lozenges are still soft, they are stamped with letters indicative of their composition.

5. **Packing.**—Lozenges should be kept in dry, well fitted stoppered bottles in a dry place. Dampness make them sticky. They are to be dispensed in wide mouth stoppered bottles.

OINTMENTS.

1. **The preparation of Ointments** is not always easy. Special tact and care can alone turn out a good product. The following general hints are worth remembering :—

(*a*) If the active drug is a **solid or a powder**, as galls, mercuric iodide, sulphur, &c., it should be reduced to a state of fine powder before admixture with the basis ; so that the ointment may be free from grittiness.

(*b*) If it is a **soluble** or **deliquescent salt**, as potassium carbonate or iodide, it should be first made into a thin paste with water, before mixing with the basis.

(*c*) If it is a **hard extract**, a **balsam** or a **resin**, a preliminary treatment with such substances, as water, oil, glycerin, rectified spirit, as the case may be, is necessary.

(*d*) If it is a **liquid extract**, as in the case of belladonna ointment, it must be evaporated to the required consistence.

(*e*) If it is an **alkaloid**, as aconitine, atropine or cocaine, it should be dissolved in oleic acid by trituration and gentle heat.

(*f*) If it is a **crystallised drug**, as boric acid, salicylic acid, iodoform, tannic acid, &c , it should be reduced to a fine powder, and triturated with its own weight of the basis for a while before adding the rest.

(*g*) If it is a **volatile substance**, such as, menthol, chloral hydrate, hydrocyanic acid dilute, chloroform, it should be mixed after all the ingredients have been incorporated ; so as to reduce its evaporation to a minimum.

2. **Basis.**—Whatever basis is selected, it should not be a chemical incompatible, or it should in no way affect the action of the ointment. Rancid lard or ointment should never be used. If the basis becomes too soft, on account of prevailing high temperatures, as in India and the colonies, indurated lard, prepared suet, yellow or white beeswax, more or less, may be added.

3. **Incorporation of a liquid** with a fatty or oily basis must be done very gradually, or better still by drops, by a slow, steady, continuous, rotatory motion, the mortar being kept warm during the process.

4. **Order of mixing** is as important in this case as in mixtures. A variation of color often results from different modes of admixture.

5. **Spatulas.**—A bone or box-wood spatula is the best for scraping, stirring or mixing ointments.

6. **Two ointments**, or an ointment and a liquid or oily substance, are better mixed on a percelain slab.

7. **Oleates** should not be melted in a metallic cup, but in a porcelain casserole.

8. **Tinctures and spirituous substances** are best incorporated with the fatty medium by spreading evenly the latter on the bottom and sides of a mortar and mixing the tinctures gradually.

OINTMENTS OF SPECIAL DRUGS.

1. **Acid Carbolic Ointment B.P.** is best prepared by using liquified carbolic acid and a cold basis. Crystallised acid dissolved in a hot medium may show crystals on cooling.

2. **Chrysarobin B.P.** when dissolved by heat partly recrystallises on cooling, as it happens in the B.P. ointment. As it is more soluble in castor oil than lard, it can be worked with lard and castor oil with satisfaction.

3 **Glycerin** can be well incorporated with extracts by first rubbing the extracts with a little hot water in a warm mortar and adding glycerin gradually.

4. **Hydrargyri Perchloridum** is sometimes prescribed in the shape of ointment. It must be triturated well with glycerin (2 ms. to 1 gr.) before mixing with the basis, otherwise minute particles would violently irritate the skin. When ordered with potassium iodide, both of them should be triturated first before admixture.

Iodine.—First triturate, then add a few drops of rectified spirit and rub with its own weight of fatty basis, and lastly mix with the remaining basis.

6. **Iodoform ointment B.P.** should be made by the cold process.

7. **Paraffin Ointment B.P.**—Unless the melted paraffins are stirred well, the ointment is sure to be lumpy. White soft paraffin should be used for colorless ointments.

8. **Resorcin** powerfully absorbs oxygen from those with which it comes in contact and becomes discoloured. Therefore, an ointment containing this drug is sure to change color.

9. **Thymol Crystals** are very irritating to the skin. With camphor (1 to 1), thymol forms a liquid which can be worked up into an ointment.

10. **Despatching.**—Where expense is not the question, ointments should be sent out in covered pots, a piece of paraffined paper intervening between the cover and the ointment. A piece of tinfoil must cover the paraffined paper when open pots are used.

JELLIES, MOLLINS AND PASTES.

1. **Jellies or gelatin-pastes** were first brought to the notice of the profession by Dr. Unna. They are neither lotions nor ointments, and have no action on the skin. They are non-irritating protectives and are supposed to exert a cooling effect on the skin, and not to interfere with perspiration. Hence, they are an **excellent vehicle** for dermatological medicaments. These are applied while hot with a brush. There are several preparations, such as, Gelatum Acid. Acetici, Gelat. Acid. Salicylic., Gelat. Ichthyol, Gelat. Iodoform., Gelat. Zincum, &c. Of these, the last is very often prescribed in eczema.

2. **Gelanthum** is Dr. Unna's latest jelly basis. Soak tragacanth 2½ drs. and gelatin 2 drs. in water 10 ozs. for 24 hours in a steam bath, press through muslin and add glycerin 5 drs. Heat the whole on a water-bath for 1 hour, and then add water in which ¼ gr. of thymol is dissolved, to make up the product to 12 ozs. by weight.

3. **Jellies for internal use** are rarely prescribed in extemporaneous pharmacy. Castor oil, codliver oil and copaiba are sometimes given in the shape of jellies.

4. **Mollin** and **Paste** (see p. 72) are used as bases for several applications.

PART III.

ADMINISTRATION OF DRUGS.

CHANNELS FOR ADMINISTRATION OF DRUGS.

Having gained a sufficient knowledge of the preparation of various official and non-official drugs, the student must direct his attention to the various routes or channels through which drugs enter the circulating fluid, and exert their influence on the whole or on a particular part of the body. The activity of a drug varies greatly with the form and the mode of administration. Thus, if it is a pill, it takes a longer time to act than if it is a mixture. Again a remedy subcutaneously injected produces its effects sooner than when administered by the mouth or rectum, or used as an inunction.

The following are the various channels through which drugs enter the system, and are used there for either general or local actions.—

1. **The Digestive Tract** is the most important and the ordinarily selected route.

(*a*) **The Mouth.**—We administer drugs by the mouth for absorption by the gastric tract. For topical action, we use gargles, collutoires, pigments, pastils, lozenges, jujubes, dentifrices, &c.

(*b*) **The Pharynx** is reached by pigments, pastils, collutoires, sprays, insufflations, lozenges and jujubes.

(*c*) **The Stomach and Intestine.**—Stomach is the chief organ of absorption. Intestine comes next. The absorption of a drug is influenced by (*a*) its *solubility*, and (*b*) the *conditions under which it is administered.* Thus, a pill takes a longer time to absorb than a mixture. Again, a mixture containing salines is more rapidly absorbed than one with metallic or alkaloidal ingredients. A drug does not act so rapidly on a full stomach as on an empty. Mixtures, draughts, pills, powders, boluses, emulsions, confections are administered by this route.

(*d*) **The Rectum** is the next important route for absorption of drugs. When the stomach rejects or cannot be reached, we take advantage of this route by enemas and suppositories.

2. **The Respiratory Tract** is the next important route.

(*a*) **The Nose.**—What the mouth is to the stomach, the nose is to the lungs. Inhalation is carried on by the nose and mouth. Collunaria, snuffs, bougies, pigments, insufflations are used here.

(*b*) **The Larynx** is reached by inhalations, insufflations (see page 72) and pigments. The last is applied by means of a piece of sponge tied to a whale bone having a proper curvature.

(*c*) **The Lungs.**—Through an extensive surface full of thin, delicate blood vessels, vapours or atomised drugs rapidly enter the system. The rapidity of absorption can be gauged from the production of chloroform anæsthesia.

3. **The Skin.**—By the following methods, we can introduce medicaments into the body through the cutaneous surface :—

(*a*) **Enepidermic.**—In this method, drugs are simply kept in contact with the unbroken skin without friction or rubbing. Pastes, plasters, poultices, fomentations, pigments, cerates, creams, ointments, &c are thus applied.

(*b*) **Epidermic or Iatroleptic.**—In this method, drugs are rubbed over the unbroken skin. As liniments, codliver oil inunction in scrofula.

(*c*) **Endermic.**—In this, the cuticle is denuded for absorption of drugs. This can be rapidly done by soaking a piece of blotting paper or some porous tissue with strong solution of ammonia, and applying it to the skin and immediately covering it with a watch glass or a piece of oiled silk. After a few minutes, a blister rises and the cuticle is removed, and finely powdered drug is sprinkled over the broken surface. The cuticle can also be removed from a blister raised by cantharides. Morphine can be thus dusted over in ovaritis, sciatica, &c. If it is desired to keep up the action, savin ointment can be applied over the denuded surface.

(*d*) **Inoculation.**—In this, the epidermis is punctured or scarified for introduction of medicaments ; as vaccination.

4. **The Subcutaneous Tissues.**—These are reached by hypodermic or subcutaneous injection ; which is done by a small syringe attached to a fine hollow needle. The operator raises a fold of the skin, generally of the arm, between the thumb and forefingers of his left hand, and with his right thrusts in the gold or golden platinum needle (iron needles soon get rusty) and empties the contents of the syringe. He withdraws the needle and presses the punctured part for a few seconds. The injecting fluid must be *small* and *neutral*, otherwise an abscess may form at the seat of the puncture. (see p. 51.)

5. **The Deep Tissues.**—By the same instrument, we can administer drugs to deeper structures, such as the muscles and nerves. When the injection is given within the substance of a muscle, it is called **parenchymatous.** As injection of strychnine in paralysis, of antitoxin in diphtheria, and of chloroform in sciatica.

6. **The Blood Vessels.**—Through these channels, blood, nutrient and saline fluids are introduced. When the transfer is the flowing blood, it is called **transfusion**, and when a saline or nutrient fluid is introduced it is called **infusion.**

(*a*) **The Veins**—The transfusion may be **immediate**, by directly introducing the flowing blood from a vein of an individual into that of a patient ; and **mediate**, when warm defibrinated blood, a saline solution or milk is infused. Both transfusion and infusion are useful in post partum hæmorrhage, collapse of cholera, syncope, &c.

(*b*) **The Arteries.**—Arterial transfusion or infusion is rarely resorted to, though advocated by some authorities. Aveling's transfusion syringe or an aspirator slightly modified can be used for this purpose, special care being taken not to introduce air into the blood vessel, though one or two bubbles unavoidably introduced cannot do any harm.

7. **The Serous Cavities.**—These are not selected for the administration of drugs for general action.

(*a*) **The Pleura.**—In empyema, we can wash the pleural cavity by antiseptic lotions.

(*b*) **The Peritoneum.**—An injection of saline solution or milk has recently been advocated in severe hæmorrhage. Peritoneum can be opened and washed by antiseptic fluid in some varieties of peritonitis.

(*c*) **The Tunica Vaginalis.**—Tincture or strong solution of iodine, liquefied carbolic acid or solution of corrosive sublimate is generally injected to produce an adhesive inflammation in hydrocele.

8. **The Conjunctivæ and Lachrymal Ducts.**—A single disc containing $\frac{1}{5000}$ gr. of atropine, dropped over the conjunctiva dilates the pupil. Collyrium, ointment and powder are applied to the conjunctivæ, and injection and style within the lachrymal ducts.

9. **The Ear** is reached by injections, drops, insufflations, &c.

10. **The Bladder and Urethra** by injections and bougies.

11. **The Vagina and Uterus** by douches, injections, pigments, pessaries, medicated cottons, &c.

12. **The Diseased Tissues**—(*a*) **Fistulæ and Sinuses** by injections and bougies. (*b*) **Wounds and Ulcers** by ointments, lotions and pigments.

DOSAGE OR POSOLOGY.

Having selected a drug and the route through which it is intended to be administered, the student must next determine its dose. The word "dose," as ordinarily understood, means the quantity of a drug which is necessary to produce a certain pharmacological action either at once or after repetitions. The study of these doses is called **posology**. By a **maximum dose**, we mean the largest quantity which can be given to an adult without producing evil effects, and by a **minimum dose**, the lowest quantity which is necessary to obtain a physiological action. The B.P. doses represent only average ordinary doses for an adult. The student must steadily bear in mind that the action of a drug varies with different doses. Thus, antimonium tart. is a diaphoretic in $\frac{1}{24}$ to $\frac{1}{8}$ gr. and an emetic in 1 to 2 grs. ; zinc. sulph is a tonic in 1 to 3 grs and an emetic in 10 to 30 grs. ; ipecacuanha radix is an expectorant in $\frac{1}{4}$ to 2 grs. and an emetic in 15 to 30 grs. Though the B.P. posology is meant as a general guide, yet the practitioner can reduce the minimum and exceed the maximum limits of the pharmacopœial doses. For instance, the B.P. dose of tr. aconite for repeated administration is 2 to 5 ms., we often give it in drop doses. Again, we daily exceed the official maximum doses of quinine salts, potassium iodide, bismuth salts, male fern, opium, &c.

In determining doses, the following circumstances should be taken into consideration :—

1. **Age.**—The dosage varies considerably with the age. By **adult dose,** we mean the dose for a person between 20 and 60 years of age. Children should get a fractional part of the adult dose. A practical method of calculating the children's doses under 12 years, is given by Young. *The rule is to divide the age in years, by the age in years plus 12 ; the resulting quotient is the proper fraction of an adult dose.* Thus :—

For a child of 1 year, the dose will be $\frac{1}{1+12}=\frac{1}{13}$ of an adult dose.

,, 4 years ,, $\frac{4}{4+12}=\frac{1}{4}$,,

,, 8 years ,, $\frac{8}{8+12}=\frac{2}{5}$,,

From 12 to 16 years, $\frac{1}{2}$ to $\frac{2}{3}$, and from 17 to 20, $\frac{2}{3}$ to $\frac{4}{5}$ are the proportions. Over 60 years, the dosage should again be diminished slightly. For hypodermic medication, the dose is one-half of what is given by the mouth, and for rectal medication, it is the normal dose plus one-fourth, except in the case of strychnine, which should be given less than what is given by the mouth (see Nux Vomica).

2. **Sex.**—Women, as a rule, being more delicate than men cannot bear full adult doses.

3. **Size and Body weight.**—Whatever quantity would be required to produce a certain physiological effect in a strong, healthy, and stout person of an enormous size and weight, is not certainly necessary to produce the same action on a thin and weak individual. The writer had a patient—a powerfully built strong and stout person, of about 6 feet and 6 inches in height, to whom he would ordinarily prescribe one and one-half of the adult doses. 4 ozs of castor oil were his ordinary dose.

4. **Temperament** has some influence on doses. A person with a sanguine or nervous temperament, requires smaller doses than one with a lymphatic one.

5. **Idiosyncrasy.**—An individual susceptibility to the action of a particular drug or drugs, has long been recognised. We often come across patients, who cannot take a grain of potassium iodide without coryza, though ordinarily, many can take it in 5 gr. doses without inconvenience. Quinine sulphate does not agree with many. The writer knows a female who became collapsed after taking 5 grs. of quinine. 3 grs. of calomel given in a cathartic pill caused a nasty salivation.

6. **Toleration and Habit.**—Certain drugs, for some reason or

other which we cannot explain, fail to produce the same effects with the same doses, when continued for a lengthened period. This is what specially happens with opium. Its dose must be increased after a while, in order to get the full or the original effects of the drug. This gradual loss of activity is due to **toleration** by **custom**. Sometimes, the person taking it becomes so addicted to its use, that he actually craves for, and indulges in, it, to the detriment of his health. This craving for a particular drug is called a **habit**. Like opium-habit, persons may contract alcohol-habit and cocaine-habit. Tolerance is also established in the case of arsenic, as the arsenic-eaters of Styria. Zinc sulphate acts as an emetic in 20 grs., but patients can tolerate the same or even more, if the dose is slowly increased, as in some nervous diseases.

7. **Rate of Absorption and Excretion**.—The quicker is the absorption, or the slower is the excretion, the greater is the effect of a drug produced. Thus, morphine subcutaneously injected, requires a smaller dose to produce a definite action, within a definite period, than what is necessary if administered by the mouth or rectum. In the same way, a drug which is slowly excreted, requires a smaller dose than one eliminated more rapidly.

8. **Mental Condition.**—A morbidly inclined state of mind to the action of a particular drug, derives the full benefit of the same, if a smaller dose is given. Thus, if a patient can be convinced that he will sleep by a certain draught, a small dose of a hypnotic would induce sleep.

9. **Fasting**.—A drug acts more powerfully on an empty stomach than on a full. Thus, the same quantity of alcohol which would intoxicate a person, if taken on an empty stomach, can be ingested if taken during or after meals.

10. **Race**.—Europeans who are accustomed to the use of allopathic drugs, require larger doses than those Indian villagers, who have never used them in their lives. For example, a native villager getting an attack of intermittent fever, can be cured by 10 to 15 grs. of quinine sulphate, while the same fever in a European would require at least four times the quantity.

11. **Disease**.—Many diseases considerably modify the dosage of medicines. Thus, opium is borne in surprisingly large doses in biliary and renal colic, and in severe inflammation of the peritoneum and intestine. Large doses of mercury are tolerated in syphilis, but in Bright's disease, both opium and mercury are ill-borne.

12. **Climate**.—It is a well known fact, that alcohol can be consumed in very large quantities in cold countries, than in hot and temperate ones.

13. **Season**.—Certain remedies no doubt affect the constitution more powerfully in a certain season of the year, than in another. Thus, iodide of potassium acts more readily during the rainy months, than in the summer.

14. **Hours of the Day**.—Temperature is low in the morning, and high in the day, consequently larger and repeated doses of stimulants are necessary for a low patient in the morning, than in the day.

15. **Time of Administration.**—It is useless to administer even a large dose of chloral hydrate when the person is in active labor for sleep, it should be given at bedtime ; when a smaller dose may produce the desired effect. Codliver oil should always be given after food ; given at any other times, it would derange digestion.

16. **Preparations of a Drug.**—Alkaloids, glucosides, neutral principles, extracts, &c. are all prescribed in smaller doses, than the crude drugs from which they are prepared. Thus, for 5 grs. of quinine sulphate, we should have to prescribe about 200 grs. of cinchona bark, had we no such preparation as quinine.

17. **Accumulation.**—Ordinarily, a drug after introduction into the body is either slowly or rapidly excreted. But, if we continue to administer it very frequently for a sufficient length of time, *i.e.* so quickly that it cannot be fully eliminated, a time might come, when it would accumulate to such an extent, as to produce suddenly toxic symptoms. This is called the **cumulative action** of a drug. It may be caused by the following circumstances :—

(*a*) *A rapid absorption and slow elimination of a drug.*—This occurs in the case of lead and mercury, both of which are eliminated slowly and with difficulty by the kidneys.

(*b*) *A sudden arrest of the excretion of a drug.*—Digitalis and strychnine are cited as examples of this class- During a course of digitalis treatment, if no precaution is taken, symptoms of poisoning may suddenly develop, without any increase of the dose. These toxic symptoms are said to be due to the powerful contraction of the renal vessels, which suddenly retards the elimination of the drug.

(*c*) *A sudden solution and absorption of a sparingly soluble drug owing to some changes in the contents of the intestine* (Hale White).

GROUPING OF DOSES.

The following grouping of doses will be an useful adjunct to the study of posology.—

Group.	Doses.
Acids, inorganic diluted, all (except hydrobrom. 15 to 60 ms.)	5 to 20 ms.
,, vegetable crystallised (except tannic 2 to 5 grs.)	5 to 20 grs.
Aquæ, all (except laurocerasi ½ to 2 drs.)	1 to 2 ozs.
Confections, all	60 to 120 grs.
Decoctions, all	½ to 2 ozs.
Effervescent powders, all	60 to 120 grs.
Extracts alcoholic, non-poisonous	2 to 8 grs.
,, ,, poisonous	¼ to 1 gr.
,, **aqueous**, (except aloes barb. 1 to 4 grs., krameriæ 5 to 15 grs. and opii ¼ to 1 gr.)	2 to 8 grs.
Infusions, all (except digitalis 2 to 4 drs.)	½ to 1 or 2 ozs.
Liquors, containing arsenic and strychnine	2 to 8 ms.
,, containing morphine salts	10 to 60 ms.
,, vegetable concentrated (except sarsa co. 2 to 8 drs.)	½ to 1 dr.
,, containing iron	5 to 15 ms.
Mixtures, all	½ to 1 or 2 ozs.
Oils volatile, all (except copaibæ, cubebæ 5 to 20 ms. ; santali 5 to 30 ms. ; terebinth. 2 to 10 ms. or 3 to 4 drs.)	½ to 3 ms.

Group.	Doses.
Pills, all (except ferri. 5 to 15 grs. ; phosphori 1 to 2 grs. ; plumbi c. opio. 2 to 4 grs. ; saponis co. 2 to 4 grs.)	4 to 8 grs.
Spirits simple, all (except æther 20 to 40 or 60 to 90 ms. ; juniper 20 to 60 ms.)	5 to 20 ms.
Spirits compound, all (except armoraciæ 1 to 2 drs.)	20 to 40 ms. or 60 to 90 ms.
Succi, all (except belladonnæ. 5 to 15 ms. and hyoscyam. ½ to 1 dr.)	1 to 2 drs.
Syrups, all (except cascar. arom., chloral, codeinæ, rhei, sennæ ½ to 2 drs.)	½ to 1 dr.
Tinctures, all (except tr. iodi 2 to 5 ms.)	30 to 60 ms. or 5 to 15 ms.

Tinctures of potent drugs, such as aconite, belladon., cannab. Ind., cantharidis, capsici, chloroform. et morph. co., cocci, colchici., croci, digitalis., ferri perchlor., gelsemii., lobeliæ æther., nucis vom., opii, podophylli, scillæ, stramon., and strophanthi are given from 5 to 15 ms.

INCOMPATIBILITY AND ANTAGONISM.

A prescription should not contain such ingredients, as would counteract with each other either physically, chemically or physiologically, when mixed together. If they do so, they are known as **incompatibles**. An incompatibility therefore may be of the following kinds :—

I. **Physical.**—This is also known as *pharmaceutical*, and occurs when the ingredients are not soluble in water, so as to produce a clear solution. As oils, insoluble powders, some spirits, resinous tinctures, some extracts, &c., when ordered in a mixture.

II. **Chemical.**—Such drugs should not be prescribed as would chemically react on one another, unless such a reaction is desired. Chemical incompatibility can be classified under two heads :—

A. **Homogeneous.**—In this *no visible change of form*, such as the liberation of a gas or formation of a precipitate occurs, though color may be changed. Thus, acids and bases are chemically and physiologically incompatible with each other ; *e. g.* lactic acid with lime water, diluted hydrochloric acid with aromatic spirit of ammonia. Again, if the resulting salt is soluble and poisonous, the chemical neutralisation can not resist the toxic action, as hydrocyanic acid and alkalis, for KCN is as poisonous as HCN, although the alkaline carbonates are not incompatible with HCN.

B. **Heterogeneous.**—In this there is *a visible change of form, i.e.*, the production of a gas or a precipitate. CO_2 is the chief gas liberated in such a decomposition, sometimes H_2S. The precipitates or the insoluble compounds form the largest chemical incompatibles. This class can again be subdivided into :—

1. **Intentional.**—Seidlitz powder, black wash, yellow wash, sodii citro-tart. efferv., all effervescing mixtures, &c. are examples of this variety. Vegetable astringents with chalybeates, and lead salts with solutions of opium also come under this category.

2. **Avoidable.**—This form of chemical incompatibility is very difficult to master. A complete knowledge of chemistry and solubility of drugs can alone help the student out of this difficulty. The following rule would greatly minimise his errors :—"*A drug should never be ordered in combination with any of its tests or antidotes.*" Thus, carbonates should not be given with free acids (except HCN and H_2S) ; acid salts, basic salts, double citrates *e.g.* scale preparations of iron, halogens with solution of ammonia, &c.

Alkaloidal salts should not be prescribed with alkaline carbonates or hydroxides, *e. g.* liqr. strychnine with spt. ammon. aromat, or morphine acetate with sodium or potassium bicarbonates, &c. Pot. iodide and tannic acid also throw down alkaloidal precipitates, especially if the solution is concentrated. (see p. 83). Many fatal accidents have taken place from swallowing the last dose of a mixture containing a poisonous alkaloidal precipitate. Although, to some extent, the alkaloidal incompatibility can be avoided by the addition of HCl and alcohol, yet it is a safer plan to follow the practical rule of Dr. W. G. Smith ;—"*All poisonous alkaloids should as far as possible be prescribed in simple solution, and not in too concentrated a state.*"*

Sometimes explosive combinations result from inattention to grave incompatibility. (see p. 111)

III. **Physiological.**—When a pharmacological action of a drug is antagonised by that of another, both drugs are **physiological incompatibles** or **antagonists.** It is presumed that this antagonism takes place either in the blood or in the tissues. We do not know any drug which can fully and completely counteract the action of another on all points, though instances are common where **partial antagonism** takes place. Thus, opium contracts the pupils and depresses the respiratory centre, belladonna dilates the pupils and stimulates the respiratory centre (see Opium and Belladonna) ; hence both of them are partially physiological incompatibles to each other. Digitalis counteracts the action of aconitine on the heart ; and strychnine and burcine that of physostigmine, bromides and chloral hydrate on the cord. The depressant action of aconitine on the heart is also neutralised by the stimulant action of atropine, daturine and hyoscyamine on the same organ. Pilocarpine increases salivation and perspiration and atropine checks them.

---

* This portion is written from Dr. Smith's article in the *Practitioner*, Oct., Nov., and Dec. 1899.

EXPLOSIVE COMBINATION.

Certain drugs, such as, chlorates, bichromates, iodates, nitrates, picrates, permanganates, oxide of silver, &c., are **rich in oxygen** or part with it very easily; while others, such as, sulphur, sulphides, iodine, reduced iron, hypophospites, organic powders, charcoal, camphor, iodide of iron, ammonia salts, essential oils, &c, are **easily oxidisable**. An admixture between any two of these classes is sure to result in an explosive combination. The following are a few typical examples.—

1. A few tablets of potassium chlorate kept in a pocket with a box of safety matches caused explosion.
2. Potassium chlorate with tannic acid, morphine hydrochloride or gallic acid mixed as a dry powder exploded.
3. A mixture of tr. ferri perchlorid., glycerin and potassium chlorate explodes when warm.
4. Calcium hypophosphite alone when triturated hard, sometimes causes explosion. Never heat it with glycerin.
5. Potassium permanganate should not be made into a pill with vegetable extracts or combined with glycerin. (see p. 89).
6. Oil of turpentine and sulphuric acid, and amber oil and nitric acid are sure to explode violently.
7. Oxide or nitrate of silver with creosote forms a compound which may take fire if it becomes warm.
8. Chromic acid with glycerin, ether, strong alcohol, or organic substances causes an explosive combination.
9. Chloral hydrate and spt. ammon. aromat. in a mixture liberate so much chloroform as to explode.
10. Bismuth subnitrate and sodium bicarbonate given in a mixture, liberate CO_2 to cause an explosion. (see p. 81)
11. Tr. iodine and solution of ammonia should not be prescribed together, as iodide of nitrogen is formed, which causes explosion. (see p. 82).
12. Erythrol tetranitrate is very sensitive to percussion. A young chemist lost his life from explosion due to the rubbing of the tetranitrate with milk-sugar in a mortar.

COMBINATION OF DRUGS.

One or two words with reference to the combination of drugs, will be of use to a prescriber, whose first aim ought to be to present his patient with an effective and rational prescription free from incompatibles. An admixture of 12 or 15 ill-understood and ill-chosen drugs, in the hope that either one or other of them may hit the right nail on the head, can no longer be tolerated in these days of rational therapeutics. The student is therefore strongly advised never to prescribe unless he is quite sure of the pharmacology of drugs he is using. Simplicity in combination should be the rule, but it therefore does not follow, that one drug only at a time is to be given in distilled water. A valuable and an effective combination of judiciously and carefully selected medicines, so as to secure the fullest share of assistance, which each one could render to the other, is of the utmost value in the treatment of diseases. The following are the advantages claimed therefore for a good combination :—

1. *The efficacy of a drug can be greatly increased by combining it with different preparations of the same* Thus, if we desire to obtain the full effects of cinchona, we can get them best by combining its extract, tincture, and infusion in one prescription. So also the full effects of calumba by prescribing tincture and infusion at the same time.

2. *By a combination of various drugs, whose actions bear resemblance with one another, we can augment or intensify certain properties of a drug.* Thus, a mixture of salts of potassium, sodium and lithium would produce more diuresis, or increase the alkalinity of urine more rapidly, than when given separately. If we desire to increase the astringent action of kino, we should combine it with catechu, krameria and logwood.

3. *By a careful admixture of corrigens, we can correct unpleasant and undesirable virtues of a drug.* Thus, ginger is added to Pulv. Rhei Co., Pulv. Jalap. Co., and Pulv. Scammon, Co. to remove the griping properties of the potent drugs. Hyoscyamus and belladonna correct the griping caused by colocynth. Hydrobromic acid lessens the cinchonism of quinine, and sal volatile the iodism of iodides. Arsenic prevents a bromide rash, and atropine the unpleasant symptoms caused by the injection of morphine.

4. *By a combination of two or more drugs individually producing entirely different physiological effects, we can sometimes increase the potency of a remedy in a particular direction.* Thus, by combining mercury and iodide of potassium with digitalis and squill, we can increase the diuretic properties of the latter drugs. The action of magnesium sulphate is enhanced by the admixture of iron and sulphuric acid. Iron and digitalis in combination are more powerful cardiac tonics than when they are given uncombined.

5. *By regulating the doses of various medicines of a particular class, though differing in their modes of action, a better and more valuable remedy can be obtained.* Thus, by prescribing potassium bromide and morphine in combination, we can induce sleep more effectually than if they are given separately. A good and effectual purgative is obtained by mixing jalap with cream of tartar, as Pulv. Jalap. Co.

6. *By mixing such drugs as chemically decompose each other, we at times get better results from the resulting products.* Thus, by giving potassium or sodium carbonate with citric acid, we derive the benefit of carbonic acid gas and patassium or sodium citrate. When mercuric chloride and potassium iodide are combined in a mixture, iodide of mercury is formed, which is much

stronger and more efficacious than the salt prepared by an elaborate process.

7. *By a combination of such substances as would assist the solubility or absorption of a drug, a more effective remedy can be obtained.* Thus, salicylic acid is almost insoluble in water, but it is rendered entirely soluble by the addition of borax, alkaline carbonates, hydroxides, &c. (see Acidum Salicylicum) The absorption by the skin of the alkaloids of belladonna is greatly facilitated if belladonna is combined with fat, glycerin, oil or chloroform. Oleic acid is combined with alkaloidal salts in ointments, because it is a solvent for the same.

8. *For preservation of certain substances, a combination becomes necessary.* Thus, we add alcohol to preserve juices and liquid extracts, and glycerin animal ferments.

9. *A combination becomes essential when we want to divide a potent drug.* Thus, to divide strychnine (see p. 77), arsenic or atropine, we mix them with sugar of milk or any other inert powder.

ART OF PRESCRIBING.

WEIGHTS AND MEASURES IN A PRESCRIPTION.

The weights, and measures of capacity and length, used in a prescription are of the imperial system (see p. 12), though the scruple and the drachm are still permitted to exist under protest. Besides, certain signs indicating weights and measures of capacity are also common, which have not been officially recognised. They are :—

G. = Granum, 1 grain = $\frac{1}{480}$ of a Troy ounce or $\frac{1}{437}$ of an Avoirdupois ounce.
℈. = Scrupulum, 1 scruple = 20 grains.
ʒ. = Drachma, 1 drachm = 3 scruples or 60 grains; or $\frac{1}{8}$ of a *fluid* ounce, or 60 minims.
℥. = Uncia, 1 ounce = 1 Troy oz. (480 grs.) or 1 fl. oz. (480 minims) or 437·5 grains of water.
M. = Minimum, 1 minim = $\frac{1}{60}$ part of a drachm or the volume of ·91145 grains of water.
Gtt. = Gutta, 1 drop, supposed erroneously to represent 1 minim. (It varies so much in size that it should neither be used in dispensing nor as a measure for powerful drugs (see p. 77).
O. = Octarius, 1 pint = 20 fluid ounces, or 1¼ lbs. of water.
C. = Congius, 1 gallon = 8 pints or 10 lbs. of water.

ENGLISH DOMESTIC MEASURES.

A tea-spoonful = 1 fluid drachm ʒi or a little more.
A dessert-spoonful = 2 fluid drachms ʒii (about.)

A table-spoonful = 4 fl. drms. or $\frac{1}{2}$ ounce ʒiv or ℥ss. (about.)
A wine-glassful = 2 fl. ounces ℥ii or more.
A gill = 4 fl. ozs. ℥iv or more.
A tea-cupful = 7 fl. ozs. or more.
A breakfast-cupful = 12 fl. ozs. or more.
A glassful = 12 fl. ozs. or more.
A tumblerful = 15 to 20 fl. ozs.

These are only average measurements, for no cups or spoons are of the same size.

INDIAN DOMESTIC MEASURES.

MEASURES OF CAPACITY CURRENT IN THE BENGAL PRESIDENCY.

A Half-kancha = $\frac{1}{8}$ chattack or $\frac{1}{128}$ seer = 2 fl. drachms (about).
A Kancha = $\frac{1}{4}$ ch. or $\frac{1}{64}$ seer = 4 fl. drm. or 218·75 grs. of dist. water.
A Half-chattack = $\frac{1}{8}$ poa. or $\frac{1}{32}$ seer = 1 fl. ounce (about).
A Chattack = $\frac{1}{4}$ poa or $\frac{1}{16}$ seer = 2 fl. ,, (about).
A Poa = $\frac{1}{4}$ seer = 8 fl. ounces. (about).
A Half-seer = $\frac{1}{2}$ seer = 16 fl. ounces. (about).
A Seer or 64 kancha or 16 chattacks = 32 fl. ounces (about).

MEASURES OF CAPACITY CURRENT IN THE BOMBAY PRESIDENCY.

A Sundia-palliful = 1 drm.
A Curd-palliful = 5 tollas or 2 ounces.
A Swayapak palliful = 10 tollas or 4 ,,
A Panchpatriful = 8 or 12 ,,
A Lota or tambiaful = 3 or 4 lbs.

ABBREVIATIONS OR CONTRACTIONS IN PRESCRIPTIONS.

Ambiguous nomenclature is a source of confusion and error, and must therefore be avoided in prescriptions. The following are a few examples of ambiguous nomenclature :—

Mag. Calc.	may mean	either	Mag. Ponderosa* or Mag. Levis.
,, Carb.	,,	,,	Mag. Carb. Ponderosa or Mag. Carb. Levis.
Bismuth.	,,	,,	Bismuth Carb., Bismuth Oxide., Bismuth Subnitras * or Bismuth Salicylas.
Aloes	,,	,,	Aloes Soc.* or Aloes Barb.
Æther Chloric	,,	,,	Ether Chloric (Duncan's) or Spt. Chloroformi B.P.*
Ferri Cit.	,,	,,	Ferri et Ammon. Citras,* or Ferri et Quininæ Citras.
Liq. Morph.	,,	,,	Liq. Morphin. Hydrochlorid., Liq. Morph. Acetat. or Liq. Morph. Tartrat.

Ext. Belladon.	may mean either	Ext. Bellad. Alcohol., Ext. Bellad. Liq., or Ext. Bellad. Viride.*
Acid. Hydroc.	,, ,,	Acid. Hydrocyanicum or Acid. Hydrochloricum.
Ext. Col.	,, ,,	Ext. Colchici or Ext. Colocynth.
Hyd. Chlor.	,, ,,	Hydrate Chloral, Hydrarg. Chloridum (calomel) or Hydrarg. Perchlorid. (corrosive sublimate).
Aquæ Menth.	,, ,,	Aquæ Menth. Pip.* or Aquæ Menth. Virid.
Liq. Plumbi †	,, ,,	Liq. Plumb. Subacetat. Fort. or Liqr. Plumb. Subacetat. dil.*

The following contractions of words are ordinarily seen in prescriptions :—

Contr.	*Name.*	*Meaning.*
Aa	Ana	Of each.
Ad.	Adde	Add.
Aq.	Aqua	Water.
C.	Cum	With.
Capts, Cpt.	Capiat	Let the patient take.
Colo	...	To strain.
Co. or Comp.	Compositus	Compound.
Div.	Dividatur	Divide.
Et.	...	And.
F.	Fac	Make.
Ft.	Fiat	let it be made.
Gr.	Granum	A grain.
Gtt.	Gutta	A drop.
Haust.	Haustus	A draught.
H.	Hora	An hour.
In.	...	In or into.

Contr.	*Name*	*Meaning.*
Levis	...	Light.
M.	Massa	A mass.
M.	Misce	Mix.
M. or Min.	Minimum	A Minim.
Mist.	Mixtura	A Mixture.
Mitte	...	Send.
Om.	Omnis	All, every.
R.	Recipe	Take thou.
Repet.	Repetatur	Let it be repeated.
Sine	...	Without.
Sig.	Signa	Mark thou.
Ss.	Semis	Half.
Stat.	Statim	Immediately.
Talis.	...	Such.
Ver.	Verus	Genuine.
Vitellus	...	The yolk of an egg.

The following contractions of phrases are often used in prescriptions :—

Contraction.	*Phrase.*	*Meaning.*
Ad lib.	Ad libitum.	At pleasure.
A. h.	Alternis horis.	Every other hour.
Aq. Bull.	Aquæ Bulliens.	Boiling water.
,, **Dest.**	,, Destillata.	Distilled water.
,, **Ferv.**	,, Fervens.	Hot water.
Bis. ind.	Bis indies.	Twice daily.
B.P. or **Ph.B.**	Pharmacopœia Britanica.	British Pharmacopœia.
Coch. amp.	Cochlear amplum.	A table-spoonful.
,, **mag.**	,, magnum.	Do.

---

* In practice, preparations with * are dispensed when no reference can be made to the prescriber.

† This was the subject of a question in practical dispensing. It was intended for Goulard's lotion.

Contraction.	*Phrase.*	*Meaning.*
Coch. med.	Cochlear medium.	A dessert-spoonful.
,, min.	,, minimum.	A small tea-spoonful.
,, parvum	,, parvum.	A tea-spoonful.
C. vinar.	Cyathus vinarius	A wine glassful.
D. in p. æ or Div. in p. æq.	Dividatur in partes æqualis	Divide into equal parts.
F.H. or Ft. Haust.	Fiat Haustus.	Let a draught be made.
F.M. or Ft. Mist.	Fiat Mistura.	Let a mixture be made.
Ft. Mas. in pil. xii div.	Fiant Mass in pilulæ xii dividenda.	Let a pill mass be made and divide into 12 pills.
H.d	Hora decubitus.	At bed time.
H.s.s.	Hora somni sumendum	To be taken at bed time.
M.b.	Misce bene.	Mix well.
M.d.u.	More dicto utendum.	To be used as directed.
M.P.	Massa Pilularis.	A pill mass.
Mic. pan.	Mica panis.	Crumb of bread.
Ne. tr. s. num.	Ne tradas sine nummo.	Do not deliver unless paid.
O.M.	Omni mane.	Every morning.
Omn. bih.	Omni bihora.	Every two hours.
O.n.	Omni nocte.	Every night.
P.r.n.	Pro re nata.	When required.
Q.s.	Quantum sufficiat.	Sufficient quantity.
Q.h. O.h.	Quaque hora or Omni hora.	Each or every hour.
S.s.	Statum sumendum.	Immediately to be taken.
T.d.	Ter. indies.	Thrice daily.

PRESCRIPTION WRITING.

A Prescription is **simple**, when it contains a basis and a vehicle or excipient with or without a corrective ; and **complex**, when it contains several adjuvants and corrigents besides the basis. The construction of a model prescription must be in the following order :—

1. The **superscription**, which consists of the symbol Re, which originally symbolised the planet jupiter, but is now an abbreviation of **recipe**=*take thou.*

2, The **inscription** or the body of a prescription, containing the **bssis**, the **adjuvant**, the **corrigent** and the **vehicle** or **excipient**.

3. The **subscription** or the directions to the dispenser, such as *misce*, *fiat*, *mist*, *pilula*, *&c.*

4. The **signature** (from *L. signetur*—let it be labelled) or the directions to the patient. This is written either in English or in vernacular.

5. The **prescriber's name or initials** and the **date**. These we put at the bottom. The patient's name should be invariably written at the top of *recipe.*

The following is an example of a model prescription :—

Patient's name. W. Thomas Esqr.

Superscription. ℞

Inscription.	Liqr. Ammon. Acetat.	ʒii (*Basis*)
	Pot. Acetas	gr. x (*Adjuvant*)
	Spt. Æther. Nit.	m. xx (*Adjuvant*)
	Syr. Aromat.	ʒi (*Corrigent*)
	Aq. Destil.	ad. ℥i (*Vehicle*)

Subscription. M., ft. mist., Mitte talis vi,
div. in p. æ.*

Signature. *Sig.*, $\frac{1}{6}$*th* part every 3 hours during fever.

Date 20. 1. 01. *Prescriber's name* R. Ghosh.

It is customary to write prescriptions in Latin. They can be written in any language as long as they can be dispensed. They should be legibly written and ambiguous nomenclature avoided. In case the B.P. limits of doses are exceeded, the doses should be initialed. They must be revised, and if possible their copies kept, before they are handed over.

ELEGANT PRESCRIPTIONS.

Elegance in a prescription should always be aimed at. It, therefore, does not follow that the student should prescribe only fancy pills, capsules, tablets and cachets. These are good and useful, but they cannot supply the place of a mixture. The importance of giving a mixture in an inviting and palatable form cannot be overestimated. We have various flavouring agents. Aromatic syrup, syrups of orange, orange-flower, glucose, hemidesmus, lemon, Virginian prune, tolu and ginger are the popular ones. During hot months, mixtures containing syrups soon decompose, but glycerin and flavouring waters can be substituted for them. Spirit of chloroform, chloroform water and liquid extract of liquorice cover the taste of many bitter and saline mixtures. Syrup of yerba santa disguises pretty well the taste of quinine salts. Rose water, orange-flower water, cinnamon water and anise water are good flavouring vehicles either for mixtures or lotions. Cinnamon water very well disguises the odor of castor oil. Syrups of roses and red-poppy are only used as colouring agents. Compound tinctures of lavender and cardamoms are used both for flavouring and colouring purposes. Liniments and ointments can be perfumed by otto of roses, oil of neroli and lavender. Nauseous and bitter powders can be given in cachets, or pills which can be coated or gilded (see p. 90—2).

---

* In India, paper or bottle graduation is generally used to mark the doses of a mixture. (see p. 76)

DIRECTIONS TO THE PATIENT.

Make it a point to give directions in a definite manner. They should be short, simple and to the point. It is very important to *mention the hour of the day*, when medicines are to be administered. To the student this may appear confusing in the beginning, but the following hints will aid him in this direction :—

1. Mineral acids as a rule are given after meals, except in cases where we want to check the excessively acid secretion—gastric juice.
2. When we want to neutralise the acid secretion, we give alkalis, such as sodium bicarbonate, &c., after food ; but before food, when the gastric secretion requires stimulation.
3. Gastric sedatives, such as acid hydrocyanic dilute, bismuth salts are best given on empty stomach, as we want their local action.
4. Pepsin, papain, Taka-diastase, extract of malt, should be given immediately after or along with the meals.
5. Pancreatin or other pancreatic ferments should be given two hours after food, along with sodium bicarbonate, as they aid duodenal digestion.
6. Codliver oil and its preparations should be administered after and not before food. If given before, they spoil appetite.
7. All preparations of iron, especially the astringent varieties are to be administered after meals.
8. All stomachics and bitter tonics, such as, calumba, chiretta, quassia are given before food.
9. Arsenic is always given after meals, except in few rare cases, where its local action on the stomach is desired.
10. Potassium permanganate is always given after food.
11. Castor oil should be given on an empty stomach in the early morning,
12. Cathartic pills containing aloes should be given after dinner, as they take about 12 hours to act.
13. Emmenagogues should be commenced at least one week before menstruation.
14. All diaphoretics act well when the patient is kept warm, and diuretics when cool.
15. Hypnotics as a rule should be taken at least half an hour before going to bed ; but sulphonal two or three hours before, as it dissolves slowly.
16. Morphine should be administered subcutaneously when the patient is in bed.
17. Bromides when given as a sedative, are to be administered after meals or at bed time.

PRESCRIPTIONS FOR CHILDREN.

With tact and caution, the student should prescribe for children. The hints given below will greatly help him in this direction :—

1. The dosage must be in proportion to the age (see p. 106).

2. The bulk of a mixture must be small, not exceed one or at the most two tea-spoonfuls.

3. Medicines must be made as palatable as possible. Children like either sweet or tasteless medicines. They refuse bitters. Euquinine can be used as a tasteless substitute for quinine salts. Quinine should not be dissolved in mineral acids, as its bitterness is intensified.

4. Infants do not refuse castor oil or cod-liver oil, but young children often reject the former but like the latter. Cod-liver oil with extract of malt is never refused.

5. Pills they cannot swallow, but powders they can, when given with honey, syrup, milk, sweetened water, malt extract or jam.

6. Suckling babes are best treated by giving medicaments to their mothers ; but some medicines, such as copaiba, oil of turpentine, make the milk so nasty, that they refuse to draw it. By giving mercury and potassium iodide to mothers, infantile syphilis can be cured.

7. They can bear belladonna and hyoscyamus in pretty large doses, like adults.

8. Arsenic too is well borne, some choreaic children can take very large doses without harm (see Arsenic).

9. A tea-spoonful of castor oil to a newly born babe is not a big dose.

10. Goodeve's Red Mixture is a very useful carminative aperient. (see Rhubarb)

11. Children are **very susceptible to opium.*** Opium and its preparations should therefore be avoided in children's practice. If at all administered, they must be given in very minute doses and their effects watched. Even, liniments and fomentations containing opium should be withheld.

12. Plain, dill or anise waters make all-round general vehicles for children's mixtures.

13. For round worm, santonin must be given on an empty stomach in large doses, either suspended in castor oil or mixed with sugar at night, and then followed by a dose of castor oil next morning. The writer gives it with calomel and sugar followed by oil.

14. Children tolerate calomel better than adults. Salivation is rare in them.

15. Expectorants are best given in the form of syrups, or mixed with a syrup.

16. To induce vomiting, ipecacuanha wine should be given in full tea-spoonful doses. Some children do not vomit at all.

---

* In some parts of India, infants are habituated to the use of opium. It is given with a view to keep them quiet while their mothers are at work. Many native wet-nurses secretly administer this drug to their wards. The writer has seen an infant only 14 months old, taking daily one grain of opium without any other evil effects than constipation.

PART IV.

PHARMACOLOGY.

GENERAL PHARMACOLOGY OF DRUGS.

By the action of a drug on the human organism, we mean an interaction between a drug and the blood and the tissues, thereby on the one hand, either modifying the composition of the blood, and altering the anatomical state and physiological activity of the various tissues; or on the other hand, affecting the composition of the drug itself. Thus, potassium chlorate, amyl nitrite, phenazone, pyrogallic acid destroy red blood corpuscles. Pilocarpine increases the secretion of saliva, atropine checks it ; sodium and potassium citrates are decomposed in the blood into carbonates.

Unfortunately, there is no law to guide the student in the determination of the pharmacology of a drug, but the following will to some extent aid him in its study :—

1. **An intimate relation exists between chemical composition and constitution, and physiological action of a drug,** as will be evident from the following :—

(*a*) *The intensity of action of a drug increases in proportion to its atomic weight*, but this is only possible in those compounds that are isomorphous, *i.e.* which crystallise in the same form. Thus, magnesia, ferrous salts, manganous salts, nickel, cobalt, copper, zinc and cadmium agree in action, but differ in degree. The toxicity of cadmium is the most and that of magnesia the least.

(*b*) *The molecular arrangement in a compound sometimes determines action of a drug, without reference to its molecular weight.* Thus, isomerides have the same chemical composition and same percentage of weight, but differ in properties, on account of their different molecular arrangements. Resorcin and pyrocatechin are isomers $C_6H_4(OH)_2$. The former is sweet and the latter is bitter.

(*c*) *It is possible to modify the physiological action of a drug by artificially modifying its chemical constitution.* Drs. Fraser, Cum Brown and others have shown that by introducing *methyl radical* into the molecules of strychnine, brucine and thebaine, new compounds are formed, which lose their convulsant property, and exhibit instead a paralysing one on the motor perephery.

(*d*) *The action of a drug is sometimes determined either by the base, the acid, or the salt ; the action of acid and base being lost by union.* Thus, caustic soda and hydrochloric acid are powerfully caustic, but this property is lost after union, for sodium chloride and water have entirely different actions.

The following table taken from Brunton will illustrate how bases and acids influence the action of medicines.

Different Acids.			Different Bases.		
Sodium	Hydrate	*caustic.*	Sodium	chloride	*neutral in action.*
,,	Bicarbonate	*anatacid.*	Potassium	,,	*muscular poison.*
,,	Sulphate	*purgative.*	Zinc	,,	*caustic.*
,,	Benzoate	*antilithic.*	Barium	,,	*muscular poison.*
,,	Salicylate	*antipyretic.*	Silver	,,	*inert.*
,,	Cyanide	*powerful poison.*	Iron	,,	*astringent, hæmatinic.*
			Mercuric	,,	*corrosive, antiseptic.*

A similarity of action is noticeable in some salts, which have different bases but have same acids ; as bromides and iodides of different metals. All nitrites act similarly.

(*e*) *Many drugs maintain a uniformity of action in whichever form they are administered, because they liberate common elements when they are broken up in the organism.* Thus, all mercurial preparations cause salivation.

2. **Action of a drug is determined to a great extent by its affinity for certain class of tissues, or by its power of acting on certain organs and tissues.** This selective action is observed in the pharmacology of almost every drug. Thus, amyl nitrite and nitroglycerin dilate the blood-vessels, ergot contracts them ; atropine, hyoscyamine, and cocaine dilate the pupils ; physostigmine, pilocarpine and morphine contract them.

The variation of action may be caused by many other influences besides the selective affinity ; such as the varying rate of solubility, rate of osmosis, rate of absorption, rate of excretion, and the interaction of various functions.

The action of a drug may be either **direct** or **local**, or **indirect** or **remote**. It may also be either **primary** or **secondary**.

The direct or local action of a drug is what it exerts on a part or organ with which it comes directly in contact. Thus, caustic potash causes irritation and sloughing when applied to the skin, hence its **immediate local** action is irritant and caustic. Copaiba during elimination stimulates urinary cells and bronchial glands, hence its **remote local** action is diuretic and expectorant.

The indirect or remote action of a drug is what it exhibits after absorption, on different parts of the body through the nervous system. For example, apomorphine hypodermically injected causes vomiting by exciting the vomiting centre, and not by exciting the gastric nerves. This is shown by a simple experiment. After injecting the drug, if the vessels are so tied that it cannot circulate to the vomiting centre, no vomiting occurs ; although it can reach the stomach. The immediate local action of aconite on the tongue is tingling and numbness, and its indirect or remote action on the heart, is the slowing of its force and tension, due to the stimulation of the vagal roots.

The primary action of a drug is what is produced by its unaltered state; *e. g.* the emetic action of tartar emetic, the stimulant action of alcohol, &c.

The secondary action is what is caused by compounds formed in the body from the decomposition of a drug; *e.g.* the conversion of rhubarb into chrysophanic acid in the body, and therefore the cure of psoriasis during a course of rhubarb treatment is due to this acid—a secondary product, which acts locally on the diseased surface during its elimination through the skin.

CLASSIFICATION OF DRUGS ACCORDING TO THEIR PHARMACOLOGICAL ACTIONS AND THERAPEUTIC USES.

Class I.—Drugs that act on the Digestive Organs.

A. Drugs that act on the tongue.—

1. Drugs that influence the sensory apparatus of the tongue.—Drugs that act on the sensory branches of the glosso-pharyngeal, lingual and chorda tympani, can be divided into the following groups :—

(*a*) **Acids** ; as vegetable and mineral acids, lemon, tamarind, vinegar, oxymel, &c.

(*b*) **Aromatics** ; as dill, anise, fennel, cardamoms, coriander, nutmeg, cinnamon, ginger, cloves, peppermint, rosemary, spearmint, &c.

(*c*) **Aromatic bitters** ; as chamomile flowers, cascarilla, orange-peel, gentian, cusparia, chiretta and serpentary.

(*d*) **Bitters** ; as aloes, calumba, cinchona and its alkaloids, nux vomica, strychnine, quassia, salicin, nim-bark, &c.

(*e*) **Demulcents** ; as acacia, linseed, almonds, starch, honey, figs, eggs, olive and almond oils, syrup, ice, isafghul, &c.

(*f*) **Nauseants**, as asafetida and valerian.

(*g*) **Pungents or acrids** ; as capsicum, cubebs, mustard, black-pepper, horseradish, &c.

(*h*) **Spirituous substances** ; as alcohol in every form, chloroform and ether.

(*i*) **Sweets** ; as sugar, gluside, glycerin, honey, liquorice, manna, &c.

B. Drugs that act on the teeth and gums.—

1. Dentifrices (see p. 68).—Chalk is an excellent basis for a tooth-powder. Charcoal scratches the enamel. The composition of a dentifrice varies, and may be of the following kinds :—

(*a*) **Antiseptic** ; which may contain quinine, carbolic acid, borax or thymol. They prevent decomposition of food lodged either between the teeth or within a cavity.

(*b*) **Astringent** ; which may contain myrrh, rhatany, catechu, betel-nut, kino or alum. Alum injures the teeth when continued long. These check bleeding and harden spongy gums.

(*c*) **Alkaline** ; which may contain chalk, soda or magnesia. They act by neutralising acidity of the saliva.

Mineral acids should be administerted through a quill otherwise they would injure the teeth. Iron stains them.

2. **Local anodynes** are used to relieve toothache, which is generally caused by exposure of the tooth-pulp from destruction of the dentine. Opium, cocaine, strong carbolic acid, arsenious acid, creosote, menthol, chloral c. camphor. &c., are introduced within a cavity of the tooth by means of a pledget of cotton wool, after the cavity has been cleaned. In the case of irritants and caustics, a second pledget should be introduced either alone or better soaked in a solution of gum mastiche in chloroform, to prevent them from touching the tongue and cheek.

C. **Drugs that influence the secretion of the salivary glands.**—Drugs that increase the flow of saliva are called **sialagogues.** Their action is dependent upon (1) the activity of the secreting cells, and (2) the rapidity of the flow of blood, so as to maintain a supply of material for secretion.

1. **Drugs which increase the salivary secretion reflexly by exciting the perephery of afferent nerves.**—These are sometimes called **reflex** sialagogues, and may again be subdivided into :—

(*a*) *Those which act by stimulating the gusttatory and the glosso-pharyngeal nerves of the mouth.*—

All vegetable and mineral acids.	Æther. Chloroform.	Alcohol. Acid salts.	Acrids or Pungents.

(*b*) *Those that act by stimulating afferent filaments of the vagus in the stomach* ; as nauseants and emetics, *e-g.* ipecacuanha and antimony.

Besides the remedial agents, mental emotion, sight, smell, &c., may reflexly stimulate the secretion of saliva.

2. **Drugs which increase the salivary secretion either by acting on the perephery of the secreting nerves or on the secreting cells.**—These are sometimes called **specific** sialagogues.—

Jaborandi.	Iodine compounds.	Mercurials.	Tobacco.
Pilocarpine.	Muscarine.	Physostigmine.	

Many drugs, such as tobacco, mercury, potassium iodide, act both reflexly through the nerves of the mouth, and specifically through the glandular cells or nerves.

3. **Antisialagogues or Antisialics** are drugs which lessen the secretion of saliva. They may do this in the following ways :—

(*a*) *By allaying irritation of the mouth and thereby depressing the irritated terminal ends of the afferent nerves.* As potassium chlorate, borax, astringent gargles, &c., which, by curing stomatitis, check excessive flow of saliva.

(*b*) *By reducing the excitability of the reflex centres 'or efferent nerves.* As opium and morphine.

(*c*) *By reducing the vascularity of the glands.* As physostigmine in large doses.

(*d*) *By paralysing the perephery of the secreting nerves.* The action of atropine is most marked in this respect. It paralyses the secreting nerve chorda tympani, and not the secreting cells, for after the secretion being entirely stopped, the stimulation of the sympathetic will induce the flow of saliva. Atropine cannot affect the vaso-dilator nerves.

Therapeutics.—The secretion of saliva is considerably lessened in fevers, Bright's disease, diabetes, belladonna and stramonium poisoning, &c., consequently dryness of the mouth and thirst are urgent symptoms. To relieve thirst, we use **refrigerant** drinks. By **refrigerants** we mean substances that are used to allay thirst and produce a feeling of coolness ; as acidulated and effervescing drinks, juices of fruits, sherbets, acid salts, acetates and tartrates. If thirst is due to a deficiency of water or excess of solubles, especially sugar, salines, &c. in the blood irritating the thirst-centre, opium relieves it, when other remedies fail.

When the mucous membrane of the mouth is irritated and inflamed, as in irritant poisoning, we use **demulcents** or substances which soothe and protect the surface (see p. 67).

D. **Drugs which act on the stomach.**—The stomach is the chief organ of digestion. For thorough digestion, the following factors are essential, *viz.*,—(1) complete mastication, (2) due secretion of the gastric juice both in quantity and quality, (3) proper churning movements of the stomach, and (4) due absorption of the products of digestion. Now, it is our object in the following pages, to discuss how far remedial agents can influence or modify the above normal processes. We have already noticed drugs that affect the functions of the masticatory organs.

1. **Drugs which influence the gastric secretion.**—

(*a*). **Drugs which increase the secretion of the gastric juice** are called **stomachics** They do so (1) reflexly by stimulating the nerves of the mouth ; (2) by rendering the contents of the stomach alkaline, as potassium and sodium bicarbonates, sal volatile, &c., given before meals ; and (3) by stimulating the nerve-filaments and dilating the blood-vessels of the stomach ; as aromatic, bitter, pungent and spirituous stomachics. They are :—

Aromatic stomachics. As in the tongue. (see p. 122).
Alkaline stomachics, as ;—
Magnesia,
Mag. carbonates,
Ammon. Carb.,
Spt. Ammon. Arom.,
Potassium and sodium bicarbonates.
Bitter stomachics. As in the tongue (see p. 122).
Spirituous stomachics. As in the tongue (see p. 122).

Therapeutics.—Stomachics are used in dyspepsia and in the convalescent stage of many acute diseases. Alkalis are largely employed in dyspepsia, before meals to increase the secretion of the gastric juice, and after meals to relieve heart-burn and acidity ; sodium bicarbonate being usually given for this purpose.

(*b*). **Drugs which decrease the secretion of the gastric juice.**—It is a known fact, that when the circulation of the stomach is less active, the secretion of the gastric juice is also diminished. Acids taken before meals reduce this flow, though they increase that of the saliva. Lead, silver, and zinc salts in small doses, opium, tannic acid, and many vegetable astringents, as kino, catechu, cinnamon, &c., reduce vascularity and act as **gastric astringents**, and indirectly as **gastric sedatives**. Most of the aromatic, bitter, pungent and spirituous stomachics, especially alcohol, ether and chloroform, in large and repeated doses materially lessen the secretion.

Therapeutics.—Hydrochloric acid dilute is given before food to prevent acidity in dispepsia.

(*c*). **Drugs that modify the composition of the gastric juice and the contents of the stomach.**—

We have considerable control over the composition of the gastric juice, and the gastric contents as shown below :—

(1) *Drugs that increase the acidity of the gastric contents.*—As hydrochloric acid dilute after food.

(2) *Drugs that neutralise the acidity.*—These may be either (*a*) **direct antacids**, as alkalis ; or (*b*) **remote antacids**, as acetate, citrate and tartrate of soda and potash, which become converted into carbonates in the blood.

(3) *Drugs that supply the deficiency of gastric ferments.*—As pepsin and papain, alone or in combination with dilute hydrochloric acid.

(4) *Drugs that prevent fermentation and decomposition of the gastric contents.*—For this purpose, we use **antiseptics**, though with temporary benefit. Large doses are injurious. They are :—

Boric acid.
Carbolic acid.
Bismuth salicylate.
Creosote.
Carbon (dry).
Eucalyptus.
Iodoform.
Naphthol.
Salol.
Sulphurous anhydride.
Sodium hyposulphite.
Sodium sulphocarbolate.
Thymol.

2. **Drugs that dilate the gastric vessels.**—The vascularity of the stomach increases on the least irritation, especially at the presence of food. All stomachics except alkalis, diluted mineral acids dilate the blood vessels in a small degree, but there are many drugs which powerfully irritate the mucous membrane, and may therefore be called **gastric irritants**, as arsenic, iron, mercury, senega, squill, gamboge, digitalis, colchicum, veratrine, copaiba, guaiacum, &c., in large or continued small doses.

3. **Drugs that contract the gastric vessels.**—Gastric astringents do this, but their use is more confined to the intestine than to the stomach.

4. **Drugs that influence the gastric nerves and muscles.**—

(*a*). **Drugs which increase the flow of the gastric juice as well as the churning movements of the stomach,** without producing those peculiar movements which cause emesis, are called **gastric stimulants**, or **gastric** or **stomachic tonics.** As mineral acids, strychnine, ether, volatile oils, &c.

Therapeutics.—Stomachic tonics are used in atonic dyspepsia, especially acid nitro-hydrochloric dilute with nux vomica and calumba.

(*b*). **Drugs which depress the gastric nerves and muscles.**—They may be either **direct** or **local**, or **indirect** or **remote** :—

(1) *Direct or local Gastric Sedatives.*—These drugs directly soothe the irritable gastric nerve-filaments by their local action. They are :—

Ice.
Bismuth salts.
Hydrocyanic acid dilute.
Carbonic acid.
Hot-water.
Opium.
Morphine.
Belladonna.
Hyoscyamus.
Stramonium.

(2) *Indirect or remote Gastric Sedatives* :—These remedies soothe gastric irritation by reflexly depressing the afferent nerves through the nerve-centres. (see counter-irritants) They are :—

Blisters.
Fomentations.
Poultices.
Morphine. }
Chloroform. } hypodermically.
Opium.
Hydrocyanic acid dilute.

Opium is very powerful in this respect. The last two are local as well as remote gastric sedatives.

There are a few gastric sedatives whose action is not yet known, such as cerium oxalate, ipecacuanha wine and tincture of iodine in drop doses.

(*c*). **Drugs that help the expulsion of gas from the stomach and bowels**—These are called **carminatives** (*carmino*, I soothe). They appear to act (1) by exciting healthy and regular peristaltic movements of these organs, (2) by dilating either the cardiac or sometimes the pyloric sphincters, and (3) by stimulating the gastro-intestinal nerves and muscles. As a result of these actions, there is either **eructation** or a discharge of flatus by the anal aperture. They are :—

Aromatics. (see p. 122).
Aromatic bitters. (see p. 122).
Ammoniacum.
Asafetida.
Camphor.
Pungents.
Valerian.
Spirits.
Volatile oils.

Of these, aromatics, asafetida and spirituous substances are the most effective.

(*d*). **Emetics.**—Vomiting is a complex physiological phenomenon, to produce which several parts are brought into play. The chief of them are the vomiting centre in the medulla and the afferent stimuli brought from various sources. **Emetics** are drugs which produce vomiting. They are generally divided into **direct** and **indirect**. By the former, we mean those that act only when they are introduced into the stomach ; by the latter, those that act by stimulating the vomiting centre, after introduction into the blood. Such a classification is erroneous, as the emetics cannot act when introduced into the stomach, except by reflexly stimulating the vomiting centre. Therefore, they should better be divided into **local** or **gastric**, and **remote** or **central**.

(1) *Local or Gastric Emetics.*—These are known to cause vomiting, as long as they keep up their action on the gastric nerves, and to stop it, as soon as they are evacuated, or carried into general circulation. No depression follows from their use. They are :—

Zinc sulphate.
Alum.
Ammon carbonate.
Copper sulphate.
Mustard.
Common salt.
Warm water (in large draughts).

(2) *Remote or Central Emetics.*—These act by stimulating the vomiting centre, through the circulation after absorption. They take a longer time to act, and are accompanied by nausea, salivation, sweat, secretion of mucus from the air-passages and œsophagus, and depression. As apomorphine, ipecacuanha, tartar emetic, squill, senega.

(3) *Gastro-Central Emetics.*—Drugs of this class act by stimulating the gastric nerves as well as the vomiting centre ; as ipecacuanha and tartar emetic.

Therapeutics.—Emetics are indicated :—

(*a*) To remove foreign bodies impacted in the throat and œsophagus.
(*b*) To expel offending digestive contents and poisons.
(*c*) To remove rigidity of the cervix in labor.
(*d*) To expel gall-stones and bile.
(*e*) To remove false membranes or over-abundant bronchial secretion.
(*f*) To aid the action of antiperiodics by removing bile in ague.

They are contra-indicated in hernia, aneurism, prolapse of the rectum and uterus, peritoneal and intestinal inflammation, and in cases where there is a tendency to hæmorrhage, atheroma of blood vessels or abortion.

(*e*). **Antiemetics** are drugs which stop vomiting either by acting locally on the stomach, or centrally on the vomiting centre. They may therefore be divided into :—

(1) *Direct or Gastric Antiemetics.*—These stop vomiting by their direct sedative action on the gastric nerves. They are :—

Alcohol (in small doses).
Arsenious acid (in small doses).
Bismuth salts.
Calomel (in small doses).
Carbolic acid.
Carbonic acid.
Chloroform.
Cerium oxalate.
Cocaine.
Creosote.
Ether.
Hot water.
Hydrocyanic acid.
Ipecacuanha wine (in 1m. doses).
Ice.
Iodine (Tr. in 1m. doses).
Morphine.
Opium.
Silver nitrate.
Sulphocarbolate.

(2) *Remote or Central Antiemetics.*—These act by removing irritation of other structures or organs, besides that of the stomach and the nerve-centres ; Vomiting caused by the passage of a calculus through the ureter or gall-duct, or by strangulated hernia, is an example of reflex or central vomiting. They are :—

Opium.
Morphine.
Bromide salts.
Chloral hydrate.
Hydrocyanic acid dilute.
Alcohol (in small doses).
Nitroglycerin.
Amyl nitrite.

Therapeutics.—Remove the cause. Ice, hydrocyanic acid dilute, ipecacuanha wine, bismuth salts, carbonic acid, &c. are ordinarily used, and are the best local antiemetics. For reflex vomiting, opium and morphine are reliable.

E. **Drugs that act on the duodenum.**—We have not so much control over this part of the digestive tract, as we have over the stomach. The normal chyme slightly acid in reaction is subjected here to a further digestive process by the alkaline secretions from the liver, the pancreas, and the intestinal glands. Drugs which aid duodenal digestion can be divided into the following two groups :—

1. **Direct duodenal stimulants.**—By increasing the acidity of the chyme towards the end of the gastric digestion, by diluted hydrochloric, nitric, nitro-hydrochloric or phosphoric acids, we can aid or stimulate the alkaline secretions in the duodenum. Alkalis given before meals increase the acid secretion in the stomach, and thereby stimulate duodenal digestion. Ether stimulates the pancreatic secretion and probably emulsifies fats and oils. Indirect cholagogues, such as colomel, increase the flow of bile already secreted, by acting as a duodenal purgative.

2. **Remote duodenal stimulants.**—Sialagogues, stomachics and purgatives, indirectly stimulate the duodenal degestion, by transmitting into the duodenum chyme having a greater acidity.

F. **Drugs that act on the intestine.**—Inorder to understand how remedies act on this part of the alimentary canal, the student must refresh his memory with the knowledge of physiology of the intestinal digestion. The chyme after transmission into the small intestine is further subjected to the digestive processes, and the chyle and other soluble constituents are absorbed by the lacteals and portal veins as the chyme is propelled downwards by the intestinal movements, known as **peristalsis**. Absorption is carried on by *osmosis* or diffusion, and excretion partly by osmosis and partly by the glands, which furnish the *succus entericus*. The excretion particularly of the watery portion is so profuse, that the effect of absorption is neutralised, and the contents of the small intestine and the duodenum remain liquid. Besides certain micro-organisms normally living in the tract, help the normal intestinal digestion, but often produce putrefactive and toxic products, which cause many dyspeptic symptoms. The muscular coat is suppled by the vagus and splanchnics ; the former increases peristalsis, and the latter restrains or inhibits it, like what the vagus does with the heart. Although these nerves maintain a connection with the brain and spinal cord, yet independently of them, as is seen when the entire nerve-supply is cut off, automatic movements may continue, which are due to the ganglia in the intestinal coats.

Four classes of remedies are known to affect the intestinal functions, viz.,—(1) the purgatives, (2) the intestinal astringents, (3) the gastro-intestinal irritants, and (4) the antiseptics.

1. **Drugs that increase the secretion and peristaltic movements.**—These drugs cause evacuation from the intestine, and are known as **purgatives, aperients** or **evacuants.** They can be divided into the following groups according to the degree and the manner of their action :—

(*a*). **Laxatives.**—These produce softened motions with a slight increase of peristalsis. They are :—

Bran bread.
Bran biscuits.
Fresh vegetables.
Honey.
Treacle.
Fruits, as—
Figs,
Tamarinds,
Prunes and
Stewed apples.
Manna.
Cassia.
Sulphur.
Magnesia.
Castor oil
(in small doses).
Almond oil.
Olive oil.

Besides those mentioned above, nux vomica, belladonna, hyoscyamus, stramonium, ergot, physostigma act as laxatives under certain conditions, but they are not ordinarily used as such. Opium and belladonna in very minute doses, (tincture m. 1) paralyse the inhibitory fibres of the splanchnics and increase peristalsis and thus act as purgatives.

(*b*). **Simple purgatives**—These are somewhat stronger than laxatives. They increase both the secretion and the paristalsis though mildly. As aloes, senna, laxatives—castor oil, fel bovinum, rhubarb and cacara sag. in large doses, magnesia.

(*c*) **Drastic purgatives.**—These are sometimes called **cathartics.** They cause large fluid motions with considerable griping and mucus discharge. In large doses they violently irritate the bowels producing mucus diarrhœa, griping (due to irregular contractions), collapse and even hæmorrhage. Hyoscyamus, belladonna, Indian hemp and aromatics correct their griping properties. They are :—

Croton oil.
Elaterium.
Gamboge.
Scammony.
Colocynth (in
large doses).
Jalap.
Podophyllum.

Many drastic purgatives produce a free and copious secretion from the intestinal glands and thereby help the removal of a lot of serum from the blood, and are therefore called **hydragogues** ; as Jalap, scammony, elaterium.

(*d*) **Saline purgatives.**—These cause liquid or watery motions by increasing the intestinal secretion, without affecting the peristalsis. The liquid may be reabsorbed. But if a large and concentrated dose of a saline solution is given on an empty stomach, the serum accumulates in the bowels, and causes their distension, which gently excites peristalsis and causes an evacuation. They are magnesium sulphate, pot. acid. tartrate, sod. tartrate, sodium sulphate, pot tartrate, sodium phosphate, sod. citro-tartrate, purgative mineral waters, as Hunyadi Janos, Pullna, Friedrichshall, Carlsbad, &c.

(*e*) **Cholagogue purgatives.**—These purge either by stimulating the liver and increasing the biliary secretion, or by exciting the peristalsis of the duodenum and small intestine, and thus hindering the reabsorption of the bile secreted. They produce greenish stools. They are :—

Calomel.
Blue pill.
Podophyllum.
Euonymus.
Grey powder.
Aloes.
Rhubarb.
Drastic purgatives (some).

Therapeutics.—Purgatives are used :—

(1) To remove fæcal accumulation.

(2) To drain serum from the blood in the case of cardiac, renal and hepatic dropsy.

(3) To lower the temperature in fevers.

(4) To lower the blood-pressure in apoplexy and cerebral congestion.

(5) To prevent straining in persons suffering from piles, aneurism or hernia.

(6) To expel bile and help the passage of biliary calculi.

(7) To remove from the blood certain excrementitious matters, such as urea, uric acid, &c.

(f) **Purgative enemata.**—(See p. 69).

2. **Drugs that decrease the secretion and the peristaltic movements of the intestine.**—These are called **intestinal astringents**, and may be subdivided according to their mode of actions under the following heads :—

(*a*) *Intestinal astringents that act by contracting the vessels.*—They are alum and lead salts, silver salts (in dilute solutions) and sulphuric acid dilute.

(*b*) *Intestinal astringents that act by coagulating albuminous tissues supporting the vessels.*—These are also called **intestinal constringents.**—They are :—

Ferric salts.
Copper salts.
Zinc „
Lead „
Bismuth salts.
Tannic acid,
and substances
containing it, as
Catechu,
Cinnamon,
Kino,
Krameria,
Eucalyptus gum,
Hæmatoxyli.

(*c*) *Intestinal astringents that act by reducing the glandular secretion.*—They are lead, calcuim salts and opium.

(*d*) *Intestinal astringents that act by diminishing the peristalsis.*—They are opium, stramonium, lead salts, belladonna, hyoscyamus, lime and bismuth salts (?).

Therapeutics.—Intestinal astringents are employed to check diarrhœa. If it is due to offending matters or impacted fæces, a laxative or a simple purgative, such as castor oil or Gregory's powder should be given.

3. **Drugs that produce gastro-intestinal irritation.**—These are known as **gastro-intestinal irritants.** Many irritant poisons are given in minute doses therapeutically, but if they are swallowed in large doses, a train of symptoms is produced which are known as toxic actions. Thus, if the irritant is caustic or corrosive, it causes burning and pain in the lips, mouth, pharynx and œsophagus. These parts soon inflame and become red and swollen.

On reaching the stomach, it sets up an intense irritation, causing severe vomiting and retching, accompanied by severe abdominal pain and tenderness. As it is transmitted into the intestine, it causes the same irritation as in the stomach, accompanied by diarrhœa. The vomiting and purging may commence so suddenly that they may be mistaken for those of cholera The vomit and stools often contain blood. General prostration, vascular depression and collapse are the chief general symptoms. If the patient survives for a few days, other symptoms, such as peritonitis, gastric or intestinal ulcers, stricture of the œsophagus may follow ; but if the patient dies soon after swallowing the poison, at the autopsy the stomach is found red, ecchymosed and swollen. The same morbid lesions are found in the intestine.

Certain irritant poisons, such as phosphorus give rise to toxic symptoms a second time after the cessation of the primary ones.

4. **Intestinal antiseptics.**—These are occasionally used to to prevent fermentation of the intestinal contents, or absorption of septic matters. Many however doubt their efficacy. Gastric antiseptics are used for this purpose (see p. 125).

G. Drugs that act on the entozoa infesting the human alimentary canal.—

1. **Anthelmintics** are drugs which kill or expel the intestinal worms. They are of two kinds, **direct** and **indirect.**

(*a*) **Direct anthelmintics** may again be subdivided into the following two groups:—

(1) **Vermifuges** (*vermis*, a worm, and *fugo*, I drive out) are those drugs, which simply expel or drive out worms without necessarily killing them ; as jalap, scammony, gamboge, &c.

(2) **Vermicides** (*vermis*, a worm, and *cædo*, I kill) are those drugs which kill intestinal entozoa. In fact, they are weakened or intoxicated. These drugs may again be subdivided according to their actions on the different varieties of entozoa. Thus we administer :—

(*a*) For **round-worm** (*Ascaris lumbricoides*), santonin.

(*b*) For **thread-worm** (*Oxyuris vermicularis*), injections *per rectum* of a solution of common salt, strong infusion of quassia or calumba, solution of ferric salts, diluted oil of turpentine and decoction of aloes. If they are lodged high up in the intestine, santonin and oil of turpentine are to be administered followed by a brisk purgative.

(*c*) For **tape-worm** (*Tænea solium and T. mediocanellata*), male fern, oil of turpentine, cusso, pomegranate root-bark, kamala, and areca nut. Recently naphthaline is advocated in round and tape worms.

(*d*) For **duodenal worm** (*Ankylostoma duodenale*), thymol, male-fern, cusso, santonin, and calomel repeatedly. This variety is very common in the Brazils, Egypt and some parts of India.

2. **Indirect anthelmintics.**—These act by improving the

general condition of the mucous membrane and lessening the secretion of mucus, which becomes the nidus for their growth. As iron salts, bitter tonics especially quassia and calumba.

H. Drugs that act on the liver.—The functions of the liver are but imperfectly understood. In short, it is a door-keeper to the circulation. However, it is known to perform the following specific actions, viz,—(1) the formation and secretion of bile; (2) the excretion of bile; (3) the conversion of carbohydrates and some portion of proteids into glycogen; (4) the storing of glycogen and its reconversion into sugar; (5) the destruction or storing up and the excretion of organic poisons formed in or introduced from without into and absorbed by the intestine, and (6) the production of urea and uric acid. In the present state of our knowledge we cannot influence all the above functions. Those that we can, are given below :—

1. Drugs that influence the secretion of bile.—Drugs which increase the flow of bile, are called **cholagogues.** They are either **direct** or **indirect**. **Hepatic stimulants**, properly speaking, are drugs which increase the functional activity of the liver, which includes no doubt the increased amount of bile formed and secreted.

(*a*) *Drugs which actually increase the secretion of bile* are called **direct cholagogues.** Sometimes they are erroneously called hepatic stimulants. They are :—

Podophyllum.
Euonymus.
Iridin.
Ipecacuanha.
Aloes.
Acid. nit-hydrochlor. dil.

Nitric Acid. dil.
Sodium salicylate.
,, benzoate.
,, phosphate.
,, sulphate.
Mercuric chloride.

Ammon. chloride.
Colchicum.
Colocynth.
Rhubarb.
Hydrastis

Antim. sulphurate.
Potass. sulphate.
Jalap.
Scammony.
Baptisin.
Dilute arsenious acid.

Of these, sodium salicylate makes the bile watery. Podophyllum and iridin increase the solid ingredients of the bile.

(*b*) *Drugs that only increase the excretion of the already formed bile, by the increased peristaltic action of the lower part of the duodenum and the upper part of the jejunum.*—In this, the intestinal bile is rapidly swept along the intestine without giving it time to be reabsorbed. These drugs are called **indirect cholagogues.** As mercurials and many cathartics.

Therapeutics.—All cholagogues are purgatives (see p. 120), because the bile stimulates the peristaltic action of the bowels. In hepatic disorders, such as biliousness, jaundice, hepatic dyspepsia, cholagogues are very useful, especially if the direct and indirect ones are combined together.

(*c*) *Drugs which lessen the quantity of the bile secreted* are called **anticholagogues or hepatic depressants**. As opium, morphine, codeine, lead acetate, magnesium sulphate, calomel, castor-oil, gamboge, &c. Therapeutically they are never used

(*d*) *Drugs that are used to dissolve gall-stones* may be called **biliary lithontriptics**.—Our knowledge of this class of drugs is very obscure. Sodium salicylate may do good by increasing the fluidity of bile. Durande's remedy (ether 3, oil of turpentine 2), olive oil, glycerin, soap, Carlsbad mineral water are said to dissolve, expel or reduce the size of the stones.

2. **Drugs that influence the glycogenic function of the liver**. They are :—

(*a*) **Glycogenic stimulants**.—As amyl nitrite, dilute nitro-hydrochloric acid and sodium bicarbonate.

(*b*) **Glycogenic depressants**.—As antimony, arsenic, phosphorus. In diabetes mellitus, opium, morphine and codeine.

3. **Drugs that influence the formation of the urea in the liver**.—It is believed that lactate of ammonia and amido-acids *e.g.* leucin a nitrogenous derivative, are converted into urea in the liver. It is also believed that phosphorus, arsenic, antimony, ammonium chloride and iron **increase** the quantity of urea excreted in the urine ; but they are never used therapeutically for this purpose. On the other hand, opium, morphine, colchicum, alcohol and quinine are believed to **decrease** the quantity of urea excreted in the urine.

CLASS II.—DRUGS THAT ACT ON THE RESPIRATORY SYSTEM.

There is an intimate relation between the respiratory organs and the external air, the blood, the circulation, the nervous system and the respiratory centre. A disturbance in any of them, at once reflects upon the respiratory mechanism For example, if the air inhaled is of abnormal pressure and temperature, or is deficient in quality or quantity, the respiratory functions are interfered with. If the condition of the red blood corpuscles which are the oxygenating elements of the body is altered, the respiratory activity is at once affected. This is also the case, if the circulation and the functions of the afferent nerves of the respiratory and other organs are modified. The object, therefore, is to remove the cause of the respiratory difficulty, either by influencing the external air, by stimulating the respiratory centre, or by depressing the centre aginst afferent impressions. Hence, drugs acting on the respiratory apparatus can be arranged under the following heads.—

A. **Drugs that are inhaled with the air**.—Chloroform and ether are inhaled diluted with air to produce general anæsthesia, but there are other groups of drugs which can be inhaled in the same manner to produce definite actions as given below :—

1. **Stimulant Inhalations**.—These increase the vascularity, muscular activity and secretion from the bronchial tubes. They are

carbolic acid 20 grs., cajuput oil 20 ms., fir-wool oil 5 ms., creosote 30 ms., cubebs ½ oz. and tr. benzoin co. ½ oz. The doses indicate the quantities to be added to a pint of water at temperature 140F. Fir-wool oil should be triturated with mag. carb. levis 2½ grs. and water 1 dr., and added to ½ pint of warm and ½ pint of cold water.

2. **Irritant Inhalations.**—These cause irritation of the bronchial mucous membrane; as chlorine, bromine, iodine, powdered senega, sulphurous anhydride, ammonia, nitric acid fumes, tobacco, &c. They are never used therapeutically.

3. **Sedative Inhalations.**—These allay or soothe the irritation of the bronchial mucous membrane; as hydrocyanic acid dilute and conium. They are rarely employed

4. **Antispasmodic Inhalations.**—These relieve bronchial spasms; as chloroform, ether, amyl nitrite, smoke of stramonium, nitre-paper, a mixture of nitre and chlorate of potash, lobelia, belladonna, &c.

5. **Antiseptic Inhalations.**—These disinfect and deodorise foul bronchial secretion; as eucalyptus oil, terebene, creosote, carbolic acid, iodoform, sulphurous anhydride, juniper oil, cubebs oil and solution of benzoin.

B. Drugs that act on the nose.—

1. **Sternutatories or Errhines** are drugs which cause sneezing and increase the secretion of the nasal mucous membrane, when locally applied. They are, tobacco (snuff); pungents as capsicum, ginger, black pepper, &c.; ipecacuanha; quillaia; senega and white hellebore, in powder

Therapeutics.—These are sometimes used (*a*) to expel foreign bodies from the air-passages, (*b*) to remove headache, (*c*) to expel fœtus in lingering labor, if there is no obstruction, and (*d*) to check hiccough. They are contra-indicated in cases, where there is a tendency to pulmonary or cerebral hæmorrhage, hernia, prolapse of the uterus and rectum, and in atheroma of the blood-vessels.

2. **Nasal sedatives** are drugs which remove irritation of the nasal mucous membrane They may be either *local*, as bismuth salts alone or with morphine, cocaine, &c., or *general*, as pulv. ipecac. co., aconite, &c.

Therapeutics.—Ordinary nasal catarrh often yields to nasal sedatives, but infectious coryza, due to hay fever or influenza, may require antiseptic nasal douche, spray, insufflation or gargle.

3. **Nasal astringents** are drugs which check epistaxis and excessive secretion of mucus from the nasal mucous membrane, when locally applied. They are alum, tannic acid, hamamelis, ferri perchlorid., ice, plugging, &c.

All inhalations more or less affect the nasal mucous membrane.

4. Drugs that act on the olfactory apparatus.—

(*a*) **Drugs that stimulate the olfactory nreves.**—The pungent vapors of certain drugs, such as ammonia and acetic acid, stimulate the terminal ends of the olfactory nerve when inhaled, and reflexly stimulate the vaso-motor and cardiac centres. In anosmia, these smells are sometimes percieved, probably from the stimulation of the nasal branches of the fifth nerve. Strychnine increases the capacity for distinguishing odors, but at the same time renders disagreeable smells, *e.g.* of asafetida, valerian, &c., agreeable.

(*b*) **Drugs that depress the terminal ends of the olfactory nerve.**—Drugs which possess very powerful odors, such as musk, asafetida and ethereal oils, first stimulate the olfactory terminations, and then after a while depress them, so that the smells cannot be perceived with the same degree of intensity. Olfactory anæsthesia can also be induced by such substances as cause acute and chronic alterations in the nasal mucous membrane, *e.g.* potasium iodide, snuff (tobacco) and irritant inhalations. (See p. 134)

C. **Drugs that influence the respiratory centre.**—The chief respiratory centre is situated at the tip of the calamus scriptorius in the medulla, at a point called *nœud vital* by Flourens, the destruction of which stops breathing and causes death. The vagal centre almost coincides in position with this spot. Properly speaking, these points form the centre of a circle, within which the respiratory impulses exert Vagus is the chief nerve of respiration, which contains both sensory and motor fibres, and therefore plays a most important part in respiratory functions. The afferent filaments which abundantly supply the whole of the air-passages and probably the lungs, constantly transmit impressions to the centre, and incessantly modify respiratory movements. Again, the muscles of the bronchi being supplied with efferent fibres of the vagus, are constantly affected by various afferent impressions, which may even arise in the very air-tubes. Besides the vagus, there are other nerves which also influence the expiratory and inspiratory movements. The action of a drug on the respiratory centre is therefore determined by the quickness of its action on the respiration, if it is injected into the carotid ; or if the vagus is cut, by comparing its action before and after its section.

1. **Drugs which directly increase the activity of the respiratory centre** are :—

Strychnine.
Atropine.
Ammonia.
Apomorphine.
Stramonium.
Hyoscyamus.
Digitalis } briefly.
Emetine }

Of these, strychnine, atropine and ammonia are very powerful.

2. **Drugs which directly depress the activity of the respiratory centre** are :—

Opium.
Codeine.
Hydrocyanic acid.
Conium.
Physostigmine.
Chloral.
Alcohol.*
Aconite.
Veratrine.
Virg. Prune.
Ipecacuanha.*
Ether*
Chloroform.*
Caffeine.*
Quinine.*
Gelsemine.
Saponine.*
Antimony salts.*

Those with * slightly excite before depressing. Pysostigmine is very powerful, but is never used therapeutically for this purpose. Opium, codeine, hydrocyanic acid dilute, conium and Virginian prune are ordinarily used.

Therapeutics.—Direct stimulants to the respiratory centre are used to increase the force of the respiratory act and thus to overcome respiratory difficulty, as in bronchitis, pneumonia, phthisis, opium and chloral poisoning, &c. Direct sedatives to the respiratory centre, especially opium, codeine, hydrocyanic acid dilute are often prescribed to allay cough reflexly set up by the irritation of the lungs, stomach, liver, spleen, pleura, trachea, bronchi, larynx, nose, pharynx and œsophagus.

D. Drugs that influence the bronchi and the lungs.—

1. Drugs that stimulate the afferent nerves are the irritant inhalations (see p. 134), and ipecacuanha and antimony internally.

2. Drugs that depress the afferent nerves are the depressants of the respiratory centre (see p. 135).

3. Drugs that affect the bronchial glands.—

(a) **Drugs that increase the bronchial secretion** are :—

Alkalis (especially ammon. carb).
Iodine.
Quillaia.
Apomorphine.
Senega.
Squill.
Ipecacuanha.
Benzoin.
Antimony salts.
Camphor.
Jaborandi.
Terebene.
Turpentine.
Volatile oils.
Asafetida.
Tobacco.
Sulphur.
Balsam of Peru.
Balsam of Tolu.
Copaiba.
Onion.
Garlic.

(b) **Drugs that diminish the bronchial secretion** are acids (powerful), belladonna, stramonium, hyoscyamus.

(c) **Drugs that disinfect the bronchial secretion** are the antiseptic inhalations, (see p. 134), and copaiba, cubebs, ammoniacum, volatile oils and oleo-resins internally.

(d) **Drugs that stimulate the nervo-muscular tissues of the bronchi** are those which excite the afferent nerves. (as drugs in D., No. 1, p. 135)

(e) **Drugs that depress the nervo-muscular tissues of the bronchi and thereby relieve bronchial spasms** are called **bronchial antispasmodics**. These may be either (1) antispasmodic inhalations (see p. 134), (2) depressants to the respiratory centre (see p 135), (3) expectorants (see p. 137), or the following :—

Stramonium.
Lobelia.
Belladonna.
Amyl nitrite.
Sodium nitrite.
Nitroglycerin.
Grindelia.
Hyoscyamus.
Tobacco.
Ether.
Chloroform.
Chloral.
Cannabis Ind.
Opium.
Ethyl iodide.
Conium.

Therapeutics.—Respiratory spasms are instantly relieved by amyl nitrite, nitroglycerin and sodium nitrite, but they quickly return. Narcotics, such as opium, cannabis Indica, chloral hydrate, being powerful respiratory depressants are objectionable, though they may relieve spasms. Potassium iodide, stramonium, lobelia, spirits of ether, chloroform, ammonia and grindelia are ordinarily used with success in asthma. Atropine hypodermically sometimes relieves when others fail. Smokes of stramonium, nitre-papers, &c. afford only temporary relief. If dyspnœa is caused by dyspepsia, gout, constipation, &c., remove the cause.

(f) **Drugs that act on the bronchial circulation.**—All remedies which stimulate the general circulation, such as digitalis,

squill, alcohol, ammonia, strychnine, aromatic oils, &c., *increase the circulation of the bronchi.* All cardiac and general vascular depressants, such as aconite, antimony, ipecacuanha, iodides, alkalis, *diminish the bronchial circulation.*

E. **Expectorants** are remedies which facilitate the expulsion of the sputum. According to their mode of action, they can be grouped under the following heads :—

1. **Antiphlogistic Expectorants.**—These increase the secretion, by subduing inflammation of the bronchial mucous membrane ; as nauseants and emetics in small doses, *e.g.* ipecacuanha, antimony, apomorphine, lobelia, potassium iodide.

2. **Stimulant Expectorants.**—They are of two kinds, *viz*,—(*a*) those that stimulate the secretion of the bronchial glands during elimination ; as (in D., 3., a. p. 135) ; and (*b*) those that stimulate the respiratory centre and strengthen the expulsive muscles ; as strychnine and atropine.

3. **Sedative Expectorants.**—These act by diminishing the irritability of the respiratory centre, or of the tracts of afferent impulses ; as opium, *e.g.* pil. ipecac. c. scilla, tr. camph. co., tr. opii ammon., pulv. ipecac. co., morphine, codeine, and chloral hydrate.

4. **Mechanical Expectorants.**—These forcibly expel the sputum during the act of vomiting ; as ipecacuanha, antimony and ammonium carbonate, which also liquefy the secretion ; or zinc sulphate if they fail.

5. **Antispasdomic Expectorants.**—These act by relaxing bronchial spasms ; as bronchial antispasmodics (see p. 136).

6. **Saline Expectorants.**—These increase the fluidity and alkalinity of the sputum ; as alkalis and alkaline salts, especially potassium bicarbonate.

7. **Antiseptic Expectorants.**—Many substances such as tar, terebene, pine-oil, sulphur, iodine, aromatic oils, balsams, and oleo-resins, are excreted as such, and thus disinfect and deodorise the mucus, along with an increased flow of the same.

8. **Reflex Expectorants.**—These promote expectoration by reflex action, through impressions produced in the mouth ; as ammonium chloride, potassium chlorate, gum acacia, sugar candy, sodium chloride (native crystal), when sucked.

F. **Anti-expectorants** are drugs which diminish the amount of water of the sputum and thus to dry up the secretion ; as acids, iron and opium.

Therapeutics.—The indications for the use of expectorants in cough have been fully detailed above. The student must discriminate well before prescribing, especially the narcotics which are very powerful depressants of the respiratory and other centres. Inhalations of warm moist air, warm poultices to the chest, warm liquid food, demulcent gargles (see p. 71) are very useful adjuncts. If the secretion is excessive, acids, iron, bracing fresh air are useful.

CLASS III.—DRUGS THAT INFLUENCE THE BLOOD.

A. Drugs that act on the liquor sanguinis or plasma.—The liquor sanguinis being the *medium of nutrition* as well as the *carrier of the products of metabolic processes*, any disturbance in its composition, directly affects the nutrition and the vital activity of the tissues and organs. We can modify the constituents of the plasma, either by food, drugs, infusion or abstraction of blood.

1. **Drugs that increse the alkalinity of the plasma are :—**

Potassium salts. Lithium salts. Ammonium salts. Alkaline mineral
Sodium ,, Calcium ,, Magnesium ,, waters.

Of these, the action of the potassium salts is rapid and powerful, but not so lasting ; and that of the sodium salts slow and weak, but more permanent. With uric acid they form soluble urates, which are eliminated by the diuretic action of the alkalis.

2. **Drugs that decrease the alkalinity of the plasma** :—The liquor sanguinis is normally alkaline, and cannot be made acid, for acid plasma cannot maintain life. But we can diminish its alkalinity by acids, especially the organic acids, as benzoic acid.

3. **Drugs that modify the composition of the plasma by the abstraction of water and salts :**—Purgatives, diuretics and diaphoretics remove a lot of serum and salts from the plasma and thus materially alter its composition. Transfusion (see p. 104) and venesection directly affect it.

Therapeutics.—Alkaline salts are largely employed in rheumatism, gout and lithiasis, especially the lithium salts in the last two diseases, on the supposition that lithium salts form more soluble urates. Potassium citrate is ordinarily used in lithiasis, as it does not derange digestion. Purgatives, diuretics and diaphoretics indirectly help the absorption of effusions in serous cavities and œdema, as well as the removal of poisons circulating in the blood, as in uræmia.

B. Drugs that influence the blood corpuscles.—

1. **Drugs that act on the red blood corpuscles.**—Healthy red blood corpuscles contain a uniform amount of hæmoglobin. Iron is its chief constituent. Drugs which improve the quantity and quality of hæmoglobin, when deficient are called **hæmatics or hæmatinics.** Of course, these actions refer to pathological conditions of the blood, for the composition of hæmoglobin in a strictly healthy blood, cannot be very much altered, though many believe that it can be improved even in health.

(*a*) **Direct hæmatics** are drugs which directly increase the amount of hæmoglobin as well as the number of red corpuscles. Iron and its various preparations are the most powerful. Next to them is arsenious acid. Potassium permanganate, phosphorus, salts of copper and potassium are doubtful in their action.

(*b*) **Indirect hæmatics** are those remedial agents which improve hæmoglobin by removing some cause which produced its deficiency or impairment. Thus, by curing ague by quinine, and syphilis by mercury, we indirectly cause anæmia to disappear. Cod-liver oil aids assimilation and removes blood dyscrasia, and thus improves red corpuscles. Fresh air, sun-light, nutritious food, out-door excrcises improve digestive powers and thus cure anæmia.

(*c*) **Drugs that affect the red corpuscles generally.**—Certain drugs, such as arsenious acid, phosphorus, iodine, sulphur, oil of turpentine hydrocyanic acid, reduce **oxyhæmoglobin**, and thus impair its oxygenating power, if given in lethal doses. Citrates, acetates and tartrates of the alkaline metals are converted into carbonates at the expense of the oxygen of the hæmoglobin. Alcohol and quinine bind oxygen so firmly to the hæmoglobin, that its oxygenating property is impaired. Carbonic acid, quinine and morphine are said to reduce the size of the red corpuscles and hydrocyanic acid and oxygen to increase it. Mercury in small doses increases their number. Nitrite of amyl, sodium nitrite, nitrous ether, phenazone acetanilide, phenacetin convert a portion of hæmoglobin into **methæmoglobin** in full doses. Pyrogallic acid and potassium chlorate destroy red corpuscles.

Therapeutics.—Both direct and indirect hæmatinics are employed in anæmia, but its cause must be ascertained and removed. Direct hæmatics are only to be given when the digestive functions and powers of assimilation are in working order. In extreme cases, transfusion of blood can be practised.

2. **Drugs that affect the white blood corpuscles.**—

(*a*) **Drugs that arrest the migration of the white corpuscles.**—The white corpuscles are migratory in their habit. If an inflammation is set up by an irritant or disease, they wander through the capillary walls. Quinine, quinidine, cinchonidine, and other cinchona alkaloids arrest their migration, if directly applied to the walls of the vessels, or while circulating in the blood. Quinine is also known to reduce their number, and veratrine kills them if applied outside the body.

(*b*) **Drugs that increase the production of white corpuscles**—Aromatics, chiefly camphor and myrrh increase their production, probably by stimulating their absorption from the intestinal canal. Pilocarpine is said also to increase their number (Horbaczewski).

C. **Drugs that act generally on the blood.**—There are many drugs which cannot be grouped under any of the above heads, as their actions have not yet been thoroughly defined. Thus, cod-liver oil increases the solid constituents of the blood. Potassium iodide and calcium salts increase its coagulability. Mercurial salts in toxic doses reduce the solids, diminish the coagulability and increase the fluidity.

CLASS IV.—DRUGS THAT INFLUENCE THE HEART AND ITS MECHANISM.

The heart is a peculiarly constructed nervo-muscular organ, performing complex functions. It is capable of originating spontaneous rythmical movements. The theory, that these movements are due to the ganglia located in the heart, is no longer believed, but evidences go to prove that they *originate from the spontaneous impulses generated in the muscular fibres of the heart, and not in the nerves and ganglia.* Though the muscular fibres spontaneously contract, yet they can be normally controlled and regulated by the nerve-centres. Two centres control the cardiac mechanism, *viz*,—the **cardio-inhibitory** and the **accelerator.** Afferent impressions from various parts of the body, including the seat of mind and the heart are transmitted to the centres in the medulla, to be reflected upon the heart. Two sets of nerves perform this function. The vagus which contains both afferent and efferent nerves not only carries the afferent impressions from the heart, lungs, &c., but inhibits the heart's action. The accelerator nerve arising from the accelerator centre, (no definite position is known) forms a part of the sympathetic, and augments the action of the heart.

When the physiology of the heart is so complicated, our knowledge of drugs acting on the heart, of course must be very imperfect. The results of experiments performed mostly on the hearts of cold blooded animals, though cannot *in toto* be applied to men, yet most of them are.

A. Drugs that modify the action of the heart.—It is not easy to determine whether a drug acts on the muscular fibres, or on the nerve-filaments. Though the apex of the heart is supposed to be free from nerve-fibres, yet it is difficult to deny their absolute absence. However, this much can be said, that if a drug acts on the excised apex, it is concluded that it acts on the muscular fibres only. Before attempting to study drugs acting on this organ, it must be remembered that if we stimulate the vagal branches, or the vagal perephery in the heart, we either diminish the force or the number of the cardiac impulses or both; and if we stimulate the accelerator nerves, we observe opposite effects. The actions produced by paralysing are the reverse of stimulating the respective nerves.

It is therefore safe to classify drugs according to their mode of action on the cardiac functions, rather than on its muscles and nerves.

1. **Cardiac tonics** are remedies which **increase the contractile force** of the heart with or without affecting the pulse-rate. The cardiac tonics which **slow the pulse-rate** are digitalis, strophanthus, squill, convallaria majalis, caffeine, saponine, veratrine, &c. Of these, the first five are generally used. In large doses they arrest frogs' heart in systole, but may or may not arrest mammals' heart in diastole. The cardiac tonics which **do**

not alter the pulse-rate are camphor, physostigmine, and minute quantities of alkaline, copper and zinc salts.

Therapeutics.—Digitalis and strophanthus are used to strengthen the heart's action enfeebled by acute febrile or imflammatory diseases, cardiac dilatation and mitral insufficiency. They are injurious in fatty degeneration of the heart.

2. **Cardiac stimulants** are drugs which **increase both the force and the number of the beats** of the heart. As brandy, whisky, rum, gin, chloroform, ether, sal volatile, strychnine, arsenious acid, musk, aromatic volatile oils, &c. Certain drugs, such as belladonna, stramonium, hyocyamus, cocaine, saponine, sparteine **only increase the cardiac beats.**

Therapeutics.—Many of the cardiac stimulants, such as anæsthetics, and alcoholic substances stimulate the heart reflexly through the nerve centres, as well as directly. They are employed to prevent a sudden failure of the heart's action from shock or syncope, due to injury, mental emotion, poisoning, febrile and other diseases. Indiscriminate use of antipyretics in fevers depresses the heart, but the timely use of alcohol, musk, and camphor may prevent their depressant effects.

3. **Cardiac depressants** are remedies which either **decrease the force** or the **number of the beats** of the heart, or both. Drugs which *diminish the contractile force and finally arrest the heart in diastole* are dilute acids, muscarine, apomorphine, pilocarpine ; and chloral, saponine, salcylic acid, alkaline salts, double copper salts, double zinc salts in large doses. Drugs which *reduce both the force and the number of the beats* are aconite, hydrocyanic acid dilute, antimony salts, veratrine and ergot.

Therapeutics.—Aconite is chiefly used to reduce the volume and frequency of the cardiac beats in inflammatory diseases. Salts of antimony are useful in acute inflammatory conditions of the air-passages and the lungs. Hydrocyanic acid dilute is an excellent remedy for the palpitation of the heart caused by dyspepsia.

B. Drugs that act on the cardio-inhibitory centre.—Action of drugs on the vagal centre, can be better studied than that on the accelerator centre. If a drug after administration to an animal, is observed to produce an alteration of the heart-beat, and that alteration is removed either by cutting the vagi, or by exciting the perephery of the nerve, if only one is divided ; we then conclude that the alteration of the heart-beat is caused by the drug acting on the vagal centre.

1. **Drugs which increase the activity of the cardio-inhibitory centre and slow the pulse-rate** are :—

Aconite.
Atropine.
Butyl-chloral.
Chloral.
Chloroform.
Convallaria.
Cocaine (in large doses).
Hydrocyanic acid.
Hyoscyamine.
Nicotine.
Squill.
Staphisagra.
Stramonium.
Strophahthus.
Veratrine.
Venous blood.
Blood-pressure (high).

2. **Drugs which diminish the activity of the cardio-inhibitory centre.**—Large doses of drugs mentioned in the foregoing list, as well as those which lower the blood-pressure, such as nitroglycerin, amyl nitrite, and cocaine depress this centre.

C. **Drugs that probably influence the accelerator centre.**—Our knowledge of this class of remedies is very imperfect. Because certain medicines still further increase the number of pulse-beats, after the vagi are cut, we suppose they act by stimulating the accelerator centre ; as ammonia, caffeine, picrotoxin and delphinine. We absolutely know no drugs which can depress this centre.

CLASS V.—DRUGS THAT INFLUENCE THE BLOOD-VESSELS.

The arteries are elastic, nervo-muscular tubes, whose calibre constantly changes owing to a variety of influennces, which are transmitted by the *vaso-constrictor* and *vaso-dilator nerves*, from the **vaso-motor centre** located in the medulla, and certain other subsidiary vaso-motor centres in the spinal cord. By the **blood-pressure**, we mean the pressure to which the walls of the arteries are subjected. The rise and fall of the blood-pressure depend upon the activity of the vaso-constrictor and the vaso-dilator nerves respectively. Besides the afferent influences affecting the blood-pressure, there are other circumstances, which greatly modify it. They are (1) the cardiac activity, (2) the total quantity of blood in circulation, and (3) the **perepheral resistence** caused by the constriction of the arterioles, and the capillary obstruction. The veins though passive tubes fitted with valves, and affected by physical conditions and arterial blood-pressure, react on the heart and the capillaries, and thus modify the blood-pressure.

We do not know how drugs act on the arterial system, whether by influencing the vaso-constrictor or the vaso-dilator nerves, probably both. But for practical purposes, they can be grouped under those that act *locally* on the blood-vessels, and those that act *through the nerve-centres.* When they act locally, it is impossible to state whether they act on the nerve-terminations or the muscular fibres.

A. **Drugs that act locally on the blood-vessels.**—

1. **Immediate local vascular stimulants** are medicines which dilate arterioles when locally applied to them. They are :—

Alcohol.
Ammonia.
Antim. tart.
Arsenious acid.
Capsicum.
Camphor,
Cantharides.
Carbolic acid.
Chlorine.
Chrysarobin.
Copper sulphate. (strong)
Creosote.
Croton oil.
Chloroform.
Ether.
Horseradish.
Iodine.
Ipecacuanha.
Mercuric nitrate.
Mineral acids. (strong)
Mustard.
Senega.
Silver nitrate. (strong)
Warmth, as Fomentation, Poultice, &c.
Volatile oils.
Zinc chloride. (strong)

Alcohol, ether and chloroform can only act in the above manner, when their evaporation is stopped. **Stimulant, irritant** and **antispasmodic** inhalations (see p.p. 133—34) also dilate the arterioles of the air-passages by their local action.

2. **Remote local vascular stimulants** are drugs which, when taken by the mouth, dilate arterioles by their remote local action on them. As amyl nitrite, nitroglycerin, sodium nitrite, spirit of nitrous ether, caffeine, erythrol tetranitrate and nicotine.

Therapeutics.—The uses of local vaso-dilators will be discussed when we shall consider drugs that act on the capillaries. Remote local vaso-dilators are indicated in cases where we want to dilate a certain vascular area, to relieve a perepheral resistence to the circulation ; as amyl nitrite in angina, spirit of nitrous ether and caffeine to produce diuresis in dropsy and anasarca by dilating the renal vessels.

3 **Immediate local astringents, local hæmostatics or styptics** are drugs which contract vessels when locally applied to them. They can be grouped under the following heads according to their mode of action :—

(*a*) *Drugs or measures that act by contracting the muscular fibres in the wall of the vessels* are cold produced by any means, as the evaporation of ether, ethyl choloride, methyl chloride and chloroform ; ice, &c. ; alum ; lead salts ; silver salts diluted ; sulphuric acid dilute ; acetanilide ; phenazone and hamamelis ; iron, calcium, cadmium, strontium, nickel, cobalt and magnesium contracting slightly. Of these, cold, alum, lead salts, diluted silver nitrate, sulphuric acid, ferric chloride and ferrous sulphate are used therapeutically.

(*b*) *Drugs that act by coagulating the perialbuminous fluids of the vessels* are alum ; salts of silver, lead, bismuth, zinc and copper ; persalts of iron ; tannic acid and substances containing it, *e. g.* kino, catechu, krameria, hæmotoxyli, galls, hamamelis, &c.

4. **Remote local astringents or remote hæmostatics** are medicines, which contract arterioles by acting locally on them, after introduction into the circulation. As ergot, caffeine in its early stage, physostigmine and digitalis.

Therapeutics.—Styptics or local hæmostatics are used (1) to stop external hæmorrhages, (2) to check excessive discharges, as in leucorrhœa, and (3) to constringe relaxed vessels, as in pharyngitis. Remote astringents are useful in internal hæmorrhages, *e. g.* ergot in hæmoptysis.

B. **Drugs that act on the vaso-motor centres.**—

1. **Drugs that dilate the vessels by acting on the vaso-motor centres.**—These are all **remote vaso-dilators** and are :—

Alcohol.
Aconite.
Belladonna.
Chloroform.
Chloral.
Ether.
Hydrocyanic acid.
Hyoscyamus.
Ipecacuanha.
Lobelia.
Opium.
Stramonium.
Tobacco.
Tartar emetic.
Veratrine.

2. **Drugs that contract the vessels by acting on the vaso-motor centres.** They are :—

Ergot (very powerful).
Digitalis.
Strophanthus.
Squill.
Physostigmine.
Strychnine.
Hydrastis.
Cocaine.
Hamamelis.
Lead and ammonia salts (slightly).

Ergot, digitalis, physostigmine contract the arterioles also by their local action on them (see remote local astringents). Many drugs, such as alcohol, ether, choloroform, stramonium, hyoscyamus, hydrocyanic acid dilute and veratrine contract only for a brief period in the beginning

C. **Drugs that act on the capillaries.**—The capillary vessels are the connecting links between the arterioles and the minute veins and through these the final distribution of the blood to the tissues is effected. Therefore, the capillary circulation is immensely important to the pharmacologist, as its disturbance greatly modifies the blood pressure (see p. 142). We can influence limited areas of capillaries, particularly those of the skin, as shewn below :—

1. **Drugs that cause a local dilatation of the capillaries and the arterioles of the skin.**—Under this head, we shall describe a host of useful remedies ordinarily known as **irritants.** They produce a greater or less degree of vascular stimulation of the part to which they are applied. They can be grouped under the following classes, according to the degree of vascular excitement they produce :—

(a) **Rubefacients** (*rubere*, to be red and *facere*, to make) are drugs which cause redness of the skin when applied to it. All immediate local vascular stimulants (see p. 142) act as rubefacients in the beginning.

(b) **Vesicants or Epispastics** cause vesicles or blisters to form over the skin, when applied to it ; *e.g.* cantharides.

(c) **Pustulants** (*pus*, matter) are drugs which produce pustules when applied to the skin ; *e.g.* croton oil and tartar emetic ointment.

(d) **Caustics or Escharotics** are drugs which destroy the vitality of the part to which they are applied. They cause sloughing and imflammation of the surrounding area ; *e.g.* caustic potash or soda, zinc chloride, mineral acids, &c.

(e) **Counter-irritants.**—When any of the above irritants is applied to the skin, with a view to lessen or counteract any morbid process which may be active in some other part of the body, it is called a **counter-irritant.** Cantharides is commonly used for counter-irritation.

2. We have other agents besides the irritant drugs, to counter-irritate the skin, such as fomentations, hot poultices, Corrigan's hammar, moxas, issues, setons and dry-cupping. The last demands more than a passing notice. The *modus operandi* of **dry-cupping** is to draw the blood to the surface by atmospheric exhaustion, and thereby to relieve hyperæmia of the subcutaneous

parts or organs. This is effected by introducing the flame of a spirit lamp within the cup for an instant, and then quickly and evenly applying it to the skin after withdrawing the flame.

Therapeutics.—For direct topical action, immediate local irritants, such as iodine, carbolic acid, cantharides, &c., are applied to unhealthy sores and chronic sinuses to stimulate their healing. Escharotics are used to destroy lupoid, cancerous and other growths. Counter-irritatants are indicated as follows :—

(1) To subdue inflammation or to afford relief to the circulation of a part or organ in direct vascular connection with the skin, selected for the application of rubefacients or vesicants; *e.g.* the application of a blister in acute pneumonia, pleurisy, hepatitis, &c.

(2) To help absorption of subjacent or subcutaneous morbid growths or effusion in a reflex way through the vaso-motor and trophic centres in the brain and cord ; *e. g.* the application of flying blisters in pleuritic effusion and synovitis, and of iodine in enlarged glands.

(3) To relieve pain arising from the passage of the renal and biliary calculi, or from neuralgia, *e.g.* sciatica and facial neuralgia.

(4) To allay central nervous irritability, as in hysteria.

(5) To stimulate central nervous system ; as in syncope, narcotic poisoning and in the lethargic conditions of many acute idiopathic and inflammatory fevers.

(6) To relieve muscular irritability, *e.g.* sinapisms in choleraic cramps and lumbago.

(7) To remove any morbid process from the seat of disease to the irritated surface ; as the application of a mustard plaster to the great toe or foot when gout attacks important organs. When counter-tirritants act in this manner, they are called **revulsives**.

By contrary procedures, we can also remove the hyperæmia of a part or organ. The chief of these are **venesection**, **leeching** and **wet-cupping**. Though they are now almost discarded, yet their utility in some selected cases is unquestionable. **Wet-cupping** consists in the scarification of the skin by a set of sharp lancets, before the dry-cupping is performed. Abstraction of blood becomes necessary in general congestion with cyanosis, in some forms of cardiac dyspnœa, apoplexy with cyanosis and stertorous breathing, uræmic convulsions, inflammation of internal organs, and in functional incompetency of the tricuspid valves.

2. **Drugs that contract the capillaries and the arterioles of the skin.**—All local vascular astringents do this (see p.p. 1442-3).

CLASS VI.—DRUGS THAT ACT ON THE URINARY APPARATUS.

A. **Drugs that act on the kidneys.**—Kidneys perform a twofold function. (1) They regulate the amount of water in the system, and remove the products of tissue-change, such as urea, uric acid, &c., which must remain in solution for excretion. The secretion of urine consists partly of filtration of water through the glomeruli, and partly of secretion by the cells of tubuli uriniferi. The circumstances which chiefly modify the urinary secretion are (1) the arterial pressure and (2) the composition of the blood. By heightening and lowering the renal and general blood-pressure, the secretion of urine can be increased and decreased respectively.

1. **Drugs that increase the amount of urine secreted** are called **diuretics**, and the effect thus produced is called **diuresis**. They act in various ways, as the following table taken from Brunton will shew :—

Diuretics.	Raise arterial pressure.	Generally ..	Increased action of the heart.	Digitalis Alcohol	Digitalis.
			Contraction of vessels in the intestine and through out the body.		Erythrophlæum. Strophanthum. Squill. Convallaria. Strychnine. Caffeine. Cold to surface.
		Locally in kidney.	Contract efferent vessels or arteriæ rectæ so as to raise pressure in glomerulus and lessen absorption in tubules or both	By action on vaso-motor centres.	?The same as in preceding list.
				By local action on vessels or nervous structures in the kidney itself.	?Broom. ?Turpentine. ?Juniper. ?Copaiba. ?Cantharides.
			Dilate afferent vessels.	Paralyse vaso-motor nerves or involuntary muscular fibre, or stimulate vaso-dilating nerves	Nitrites. Alcohol. ?Urea.
	Act on the secreting nerves or secreting cells of the kidney itself.	Increase water excreted.	Urea. Caffeine. Calomel.		
		Increase solids excreted.	Liquor potassæ. Potassium acetate, &c., and other saline diuretics.		

For practical purposes, the diuretics can be grouped under the following heads :—

(*a*) **Stimulant diuretics.**—These act by stimulating the kidney during excretion. As gin, hock, cantharides, blatta orientalis, oleo-resins, resins and volatile oils, such as copaiba, cubebs, black pepper, turpentine, juniper, buchu, uva ursi, &c.

(*b*) **Refrigerent diuretics.**—These are diluents in large draughts, as plain or ærated waters, linseed tea, barley water, alkaline mineral waters, &c. Alkaline salts expecially those of potash, while passing through the urinary cells promote diuresis, and they are therefore sometimes called **saline diuretics**.

(*c*) **Hydragogue diuretics** act by raising the blood-pressure in the glomeruli ; as digitalis, caffein, squill, strophanthus, nirtrous ether, adonis vernalis.

Therapeutics.—Diuretics are indicated either to remove **water** or **solids** from the body, and therefore we use them in :—

(1) Cardiac and pulmonary disorders, where the quantity of urine is diminished, or anasarca threatens.

(2) Renal diseases, to hasten the elimination of waste products or poisonous materials circulating in the blood. Diseases in which there has

been an accumulation of fluid in natural cavities, as pluerisy and ascites, to help its absorption.

(3) Those cases where there is a tendency for the deposition of solids and the formation of calculi.

(4) **Drugs that decrease the secretion of urine**.—We do not know any safe remedies which can do this. Cantharides, turpentine, phosphorus produce congestion of the kidneys, and then reduce the flow. Therapeutically they are never used as such.

B. Drugs that directly influence the urine.

1. **Drugs that contribute towards the acidity of the urine.—Benzoic acid and benzoates** are the only reliable remedies which render the alkaline urine acid. They are converted into **hippuric acid** in their passage through the kidneys. Salicylic, citric, and tartaric acids in large doses only feebly increase the acidity. Mineral acids have a negative effect, as they are excreted as neutral salts.

2. **Drugs that contribute towards the alkalinity of the urine.**—We have more powerful means at our disposal of rendering the urine alkaline. All potassium, sodium, lithium, and calcium salts, except the salts of ammonium are powerful in this respect. Nitric acid slightly increases the amount of ammonia and thus makes the urine feebly alkaline.

3. **Urinary lithontriptics** are remedies employed for dissolving any concretions or calculi formed in the urinary tract, or for preventing the deposition of solids from the urine. Alkalis should be given in uric acid and oxalate of lime calculi, and benzoates or benzoic acid in phorphatic ones. Potassium and lithium salts are valuable agents in converting uric acid into soluble urates as well as to alkalise the blood and urine of gouty patients. Copious draughts of water or diluents also prevent the deposition by washing away the solids

4. **Drugs that prevent the decomposition of the urine.**—Decomposition takes place either from *(a)* the retention of the urine, as in stricture of the urethra or in impacted stone, or from *(b)* the inflammation of the pelvis of the kidney or bladder, thereby causing an admixture of purulent matter with the urine. Direct or remote antiseptics, such as boric, salicylic, and benzoic acids, uva ursi, cubebs, copaiba, sandal oil, urotropine and a few volatile oils render the urine aseptic.

5. **Drugs that alter the composition of the urine.**—They do this either by *(a)* their excretion in the same original state in which they are administered, or by *(b)* the excretion of the products of their decomposition taking place in the blood or tissues, or by *(c)* the admixture of morbid products such as blood, pus, &c., produced by the remedial agents. They are too numerous to be detailed, only a few characteristic ones are given below:—

Saline diuretics increase the solids of the urine.

Santonin makes acid urine greenish-yellow or yellow, and alkaline urine reddish. Carbolic acid, creosote, naphthalene and other tar-preparations render the urine dark greenish-brown. Picric acid gives it a bright yellow color and methyl violet a dark blue. Rhubarb, senna and chrysarobin render acid urine brownish, and alkaline purplish-red. Logwood makes alkaline urine violet.

All nitrites, acetanilide, potassium chlorate, pyrogallic acid, and occasionally large doses of arsenic and mineral acids render the urine dark-red, from the admixture of the debris of the broken up red corpuscles.

Cantharides, turpentine and salicylic acid in large doses render the urine bloody. Phosphorus in larger doses causes urea, leucin and tyrosin to appear. Turpentine gives it a voilet odor, while cubebs and copaiba impart their characteristic smells.

Appearance of albumen in the urine is caused by cantharides, and is also found after poisoning by strychnine and digitalis.

Many poisons produce glycosuria ; Phloridzin or phloretin being the chief.

C.—Drugs that act on the bladder and the urethra.—By correcting any defects in the urine, *e.g* extra-acidity by alkalizers, and decomposition by urinany antiseptics, we can indirectly soothe the irritation of the mucous membrane of the bladder, but **urinary sedatives** such as opium, hyoscyamus, belladonna, stramonium, pariera, buchu, uva ursi, &c., can directly soothe the irritation. Of these, opium and hyoscyamus are powerful.

CLASS VII.—DRUGS THAT ACT ON THE CUTANEOUS SYSTEM.

The skin is the chief organ of perspiration and sensation. It performs besides certain other specific functions, such as the regulation of heat (see Antipyretics), respiration, absorption, and the secretion of *sebum*. To the pharmacologist, perspiration is the most important.

A. Drugs that act on the sweat-glands.—These glands are abundant all over the skin, but more numerous where hairs are absent, as palms and soles. The sweat like the urine is an excretion, the secreting cells eliminating substances found elsewhere. These cells are under the influence of nerves called *secreting nerves*, whose centres are in the medulla and the cord.

1. **Drugs that increase the secretion of the sweat,** but not to such an extent as would not evaporate, are called **diaphoretics**. If the perspiration is increased so much as to run down in streams, they are called **sudorifics**. They may act as follows:—

(*a*) *By directly stimulating the sweat-centres* —This may be accomplished by (1) the measures which **increase the venosity of the blood,** such as narcotics—opium, chloral, chloroform, and alcohol, in later stage of their action ; (2) The measures which **increase the temperature of the blood**, such as hot drinks ; and by (3) the following drugs:—

Dover's Powder.	Ipecacuanha.	Ammon. acetate.	Nicotine ?
Camphor.	Ammon. citrate.	Antimony.	

(*b*) *By stimulating the terminal ends of the nerves in the glands.*—Pilocarpine is most powerful in this respect. Dilatation of the cutaneous vessels by local warmth also aids diaphoresis. Nicotine is said to act similarly.

(*c*) *By stimulating the efferent nerve-trunks of perspiration.*—This can be done by electricity, though never employed therapeutically.

(*d*) *By stimulating the secreting cells.*—It is difficult to say whether a drug acts on the gland-cells or on the perephery of nerves. Possibly ammonium acetate and citrate stimulate the cells and are eliminated along with the perspiration.

(*e*) *By dilating the cutaneous vessels.*—This is easily done by exciting afferent vasor nerves by means of local heat, such as hot fomentations, poultices, hot water or Turkish baths.

(*f*) *By increasing the blood-pressure by the injestion of water or diluents.*

(*g*) *By reflexly stimulating the sweat-centres by afferent impulses, e.g.* the impulses caused by nauseating medicines, hot spiced food and hot drinks.

(*h*) *Diaphoretics*, *whose mode of action is unknown* are potassium acetate and citrate, arnica, aconite, colchicum, cubebs, salicin, serpentary, lobelia, and senega.

It must be noted, that many of the diaphoretics act in more than one way. Thus, alcohol not only stimulates the sweat-centres, but dilates the cutaneous vessels and increases blood-flow to the skin. There are others which excite the secretion, but at the same time diminish the cutaneous circulation. Diaphoretics have therefore been sometimes divided into **stimulant** and **sedative diaphoretics**. Antimony, ipecacuanha and pilocarpine are grouped as sedative diaphoretics, and the rest as stimulant ones.

Therapeutics.—Diaphoretics are indicated :—

(*a*) To reduce pyrexia, solution of ammonium acetate or citrate, Dover's powder, antimony, alcohol are ordinarily used, but they are not so powerful as the recently discovered antipyretics (see p. 153).

(*b*) To cut short a threatening catarrh, or inflammation caused by specific poisons or metabolic products.

(*c*) To lessen the accumulation of fluid in the system, as in dropsy, and to relieve excretory organs, *e. g.* kidneys in albuminuria and intestines in diarrhœa.

(*d*) To eliminate excrementitious products from the blood when kidneys fail do so, as in uræmia. Pilocarpine is most useful for this purpose.

(*e*) To promote cutaneous circulation in many chronic skin diseases *e.g*, warm water or Turkish baths in psoriasis.

2. **Drugs that diminish the secretion of sweat** are **anhidrotics** or **antihydrotics**. They may act :—

(*a*) *By depressing the excitability of or removing the cause of excitation from the sweat-centres* :—Measures which reduce the venous condition of the blood, indirectly help the reduction of perspiration. Thus cold sweats of exhausting diseases can be checked by ammonia, alcohol, strychnine, iron, fresh air and good nourishing food.

(*b*) *By depressing the activity of the efferent or secreting nerves.*—Opium in certain combinations with ipecacuanha as Dover's powder, or with sulphuric acid checks the night sweats of phthisis.

(*c*) *By depressing the activity of the terminal ends of the secreting nerves.*—The effect of atropine, extract of belladonna, stramonium, and hyoscyamine is very powerful in this respect. Measures which constringe cutaneous blood vessels, such as the application of cold, sponging with lotions containing sulphuric acid and tannic acid also check sweating.

(*d*) *By lessening the activity of the afferent nerves.*—Local cold applications, cool atmosphere, fanning, &c. do this.

(*e*) *Anhidrotics whose mode of action is unknown.*—These are acids, quinine, nux vomica, picrotoxin, zinc oxide, salicylic acid and muscarine.

Therapeutics.—Anhidrotics can be used to check either the excessive general sweating, as the night sweats of phthisis, by belladonna, atropine, zinc oxide and sometimes quinine and Dover's powder ; or the local sweating of hands and feet by the application of boric acid, salicylic acid and sponging with tincture or liniment of belladonna.

3. **Drugs that alter the composition of sweat.**—Certain drugs when taken internally are eliminated by the sweat. They are iodine, potassium iodide, tartaric acid, benzoic acid in the form of hippuric acid, and succinic acid.

B. **Drugs which soften and relax the parts to which they are applied** are called **emollients.** By relaxing contractile tissues and dilating blood-vessels they relieve tension and pressure upon the nerves. They prevent cracking of the skin by supplying it with fat or moisture As bland oily and fatty substances, glycerin, vaseline, lanoline, hot poultices, warm water, &c.

C. **Drugs that act on the capillaries and arterioles of the skin.**—See pages 143-4.

D. **Drugs that cause eruptions to appear on the skin** :—They produce them possibly by irritating the skin during their elimination. A list of drugs and eruptions taken from Quain's Dictionary of Medicine, is given below.—

Diffuse or patchy erythema.—Antipyrine, arsenic, belladonna, benzoate of sodium, boric acid, bromides, chloralamide, chloral hydrate, chrysarobin, copaiba, iodides, salicylic acid, stramonium, tar.

Scarlatiniform erythema.—Belladonna, chloral hydrate, copaiba, iodoform, quinine, strychnine, bromide of nickel.

Papular or morbilliform erythema.—Antipyrine, arsenic, bromides, chloral hydrate, cubebs, morphine, quinine, terebene, turpentine.

Nodosum-like erythema.—Bromides and iodides.

Urticaria.—Antipyrine, arsenic, bromides, copaiba, iodides, morphine, quinine, resin, salicylic acid, salol, santonin.

Vesicles.—Cannabis Indica, chloral hydrate, cod-liver oil, copaiba, iodides, morphine, salicylic acid, quinine, turpentine.

Bullæ.—Bromides, cannabis indica, chloral hydrate, copaiba, iodides, morphine, phosphoric acid, quinine.

Pustules—Arsenic, bromides (confluent), chloral hydrate, iodides (isolated), salicylic acid.

Purpura.—Chloral hydrate, chloroform inhalation, iodides, quinine, salicylic acid.

Pityriasis rubra (?).—Bichromate of potassium.

Psoriasis (?).—Borax, bichromate of potassium.

Eczema.—Bicarbonate of potassium, bromides, chrysarobin, iodoform.

Gangrene.—Arsenic, ergot, iodides, quinine.

Peristent desquamation.—Quinine.

Abscess.—Quinine.

Furuncles.—Arsenic, bromides, quinine.

Keratosis palmaris.—Arsenic.

Pigmentation.—Arsenic, nitrate of silver, picric acid.

Herpes zoster.—Arsenic.

E. **Drugs that influence the sensory apparatus of the skin.**—These are the same drugs that act on the sensory nerve-terminations. (see p.p. 155-6).

F. **Drugs that affect the hair.**—The hairs are epidermal growths contained in pits or *hair-follicles* Their growth is dependent upon the nutritive supply and the nerve-power of the skin.

1. **Drugs that promote the growth of the hairs.**—Measures which would improve the nutrition of the hair-follicles by augmenting their blood-supply, especially by immediate local vascular stimulants, aid their growth. They are liniments of ammonia, camphor, ammoniated camphor, turpentine, &c. ; lotions (hair-washes) containing tincture of cantharides, spirit of rosemary, tincture of capsicum, ammonia, pilocarpine, &c.; iodine ; mercurial ointments and oils of cade and winter green.

Therapeutics.—For baldness due to defective nutrition, *e.g.* after acute febrile attacks, stimulating hair-washes as mentioned above are useful. In obstinate cases, repeated blistering or the strong acid solution of pernitrate of mercury lightly brushed over is necessary. For syphilitic alopecia, mercurial ointments are to be applied and a constitutional treatment is to be adopted.

2. **Depilatories.**—See page 68.

CLASS VIII.—DRUGS THAT INFLUENCE METABOLISM.

Metabolism is the sum total of chemical exchanges which occur in the tissues through the medium of the blood. The protoplasm of the tissues incorporates oxygen and other metabolic materials from the plasma and gives off carbonic acid, urea, water and other products of oxidation by the lungs, kidneys, skin and bowels. During this intake and output by the tissues, the protoplasm undergoes alterations or changes. In short, the tissues and the plasma are constantly acting and reacting upon each other, the *former altering the plasma and the latter the tissues.*

The metabolic process may be affected by various influences, such as (1) the variation in the composition and the supply of blood (see p.p. 137-9), (2) the variation in the supply of oxygen, (3) the variation in the muscular activity, (4) the variation in the activity of excretory organs, (5) the variation of surrounding temperature, as of climate and baths, (6) the variation in the activity of trophic centres, and (7) the medicinal agents.

A.—Drugs that increase the metabolic activity are called **metabolic stimulants** or **tonics.** They may be either **local** or **general.**

1. Local metabolic stimulants, are drugs which stimulate the nutritive process of a local area, *e.g.* the growth of hairs over a bald surface, or the removal of stiffness, swelling, and atrophy of muscles in chronic rheumatism. They act (1) by increasing the vascularity of the part and thus carrying more nutritive materials to the tissues, (2) by removing more rapidly the products of nutrition, and (3) by increasing the protoplasmic activity of the tissues. All immediate local vascular stimulants (see list page 142) act as local metabolic stimulants.

2. General metabolic stimulants or **general tonics** are drugs which cause an increase in the strength and weight of the body, by stimulating the functional activity of the digestive organs, as well as by improving the condition of blood. Therefore, by **tonics,** we mean remedies or measures which contribute towards the improvement of the tone of the body or any of its parts. If they promote appetite and digestion, they are called **gastric tonics** ; if they enrich hæmoglobin and increase the number of red corpuscles, they are called **hæmatinic tonics** or **blood tonics** ; if the imperfectly performed nervous functions are restored to a normal condition, they are called **nervine tonics,** and so on. Medicines during the metabolic process, become loosely incorporated with the cells, and form either in them or in their presence, certain oxidation products which are thrown off ; and thus in passing through an organ, they *modify the force which it displays.* Hence, the action of general tonics is dependant upon the satisfactory actions of special tonics. The general tonics are :—

Iron.
Mercury.
Arsenic.
Phosphorus.
Antimony.
Calcium chloride.
,, Hypophosph.
Sod. Hypophosph.
Sulphurated lime.
Coca.
Caffeine.
Guaiacum.
Sarsa.
Hemidesmus.
Mezereon.
Thyroid.
Water.

3. Drugs that diminish the metabolic activity are called **metabolic depressants.**—They act either by being themselves so readily oxidised that they rob the protoplasm of oxygen, or by making the oxyhæmoglobin a more staple compound, so that it cannot easily part with its oxygen. They are alcohol, quinine, phenazone, acetanilide, salicin, glycerin, resorcin, &c.

B. **Alteratives** are drugs which cure disease without producing any perceptible change in any of the organs. They appear to **alter morbid processes**, but in the present state of our knowledge, we cannot demonstrate how they act, perhaps by improving the metabolic process through their influence on trophic centres. The most important of this group are mercury, iodine, arsenic, gold, colchicum, &c.

CLASS IX.—DRUGS THAT ACT ON THE BODY-HEAT.

By the body-heat, we mean that store of accumulated heat in the body, which is exacty balanced by its production and expenditure. This heat in a healthy subject is indicated by a temperature of about 98·4 F. in the axilla. Every vital act generates animal heat, but the muscles and the glands produce it largely. The loss of body-heat (thermolysis) is effected by radiation and evaporation from the skin, and to some extent, by respiration, evacuation and urination. Special nerve-centres (?) control the generation and loss of heat. Medicines cannot affect much the temperature in health, except in toxic doses, but they can that of the pyrexia.

A. **Antipyretics or Febrifuges** (*febris*, fever and *fugo*, I drive away) are remedies which lower the temperature of the body in pyrexia. They act in the following ways :—

1. *By diminishing the production of heat by affecting metabolism through the nerve-centres.* As phenacetin, phenazone, acetanilide, quinine, salicin, salicylic acid. Of these, the first three probably act on the corpus striatum. How the remaining act is not known, probably they lessen the production by depressing the blood-pressure and metabolism.

2. *By dilating the cutaneous blood-vessels and thus augmenting radiation.*—As alcohol, antimony, aconite, opium, warm baths. Cardiac stimulants (see p. 140) accelerate the flow and thus reduce the body-heat.

3. *By increasing the amount of perspiration* (see Diaphoretics) and thus causing a loss of heat by evaporation.

4. *By abstracting heat by internal and external refrigerants.*—Cold water, cold sherbets and ice may be swallowed for this purpose. Cold or tepid water bath, cold wet-pack, cold sponging, local irrigation with cold water, cold water compress, injection of cold water into the rectum and vagina, and evaporating lotions are agents, by which we can abstract heat from a local surface as well as that of the body.

5. *By neutralising or destroying any specific poison causing pyrexia ;* as quinine and arsenic in ague, and antidiphtheritic serum in diptheria.

6. *By using cathartics, emetics, diuretics and venesection*, we can abstract heat, but how they act we cannot say.

Therapeutics.—Antipytetics are used to reduce febrile temperature. Venesection, antimony, aconite, opium, &c, are now discarded. Phenazone, acetanilide, sodium salicylate are not so much used now, becuse they produce at times dangerous symptoms. Phenacetin is the safest though not so powerful. Quinine and salicylic acid are useful antipyretics in malarial fevers and rheumatism respectively. Cold bath, cold sponging, application of ice or evaporating lotions are the safest procedures, and can be freely used.

B. **Caloricrescents** are remedies which elevate the body-heat. They may be **local**, as fomentations, poultices, rubefacients (see p. 144) and **general**, as belladonna, cocaine, and picrotoxin in toxic doses. Certain animal poisons as that of shell fish, tuberculin and albumoses also cause a rise of temperature. β-tetrahydronaphthylamine may increase the temperature many degrees. How these remedies act is not known. Therapeutically they are never used.

CLASS X.—DRUGS THAT ACT ON THE MUSCULAR SYSTEM.

Elaborate experiments were made to determine the action of drugs on the muscles. Our scope does not permit us to go over them, we therefore give a summary of results as classified by Brunton, based on the classification of Kobert.

GROUP I.—"Leaves the irritability of the muscles unaffected, but diminishes the total amount of work it is able to do." As apomorphine, asclepiadine, delphine, saponine, copper, zinc and cadmium. Antimony, arsenic, iron and platinum in large doses.

GROUP II.—"Diminishes the excitability of the muscle as well as its capacity for work." As potassium, lithium, ammonium, quinine, chloroform, chloral and alcohol.

GROUP III.—"Diminishes the capacity for work, and produces marked irregularity in its excitability." As lead, emetine and cocaine.

GROUP IV.—"Alters the form of the muscular curve." As veratrine, salts of barium, strontium, and calcium, digitalis, squill and oleander.

GROUP V.—"Increases the excitabiiity." As physostigmine.

GROUP VI.—"Increases the capacity for work." As theobromine and caffeine.

CLASS XI.—DRUGS THAT ACT ON THE NERVOUS SYSTEM.

By the nervous system, we mean the brain, the bulb, the cord, the nerves both sensory and motor and the various ganglia. The highest motor and sensory centres as well as those of volition, intellect, emotion, &c. are contained in the cerebral convolutions, while the simple automatic and reflex centres are in the basal ganglia, cerebellum, medulla and cord. All nerve-centres are connected with one another by nerve-filaments called *collaterals*, for co-ordination of impulses, and constitute the **central nervous system.** The ganglionic system though associated with the central nervous system, are chiefly automatic in their action, and are known as the **sympathetic system.** The cerebral or highest centres are not only excitable or capable of being brought into action by afferent impulses, but possess an inherent power of spontaneously originating impulses themselves. Their action is therefore both **reflective and spontaneous.** To the pharmacologist this **reflective or reflex action** is very important. It is effected by (1) an afferent sensory nerve, (2) reflex centre, and (3) an efferent, motor or secretory nerve. An afferent impression excited by an irritant on the skin or other structures of the body, is conducted by an afferent nerve to a system of nerve-cells known as *reflex centre*, where it produces a certain protoplasmic disturbance, resulting in a force, which either remains there as a potential energy, or is conveyed by a different tract—efferent nerve, to perform some specific action either in the muscles, visceræ or the blood-vessels. Medicines can affect only some of the functions of the nervous system as shewn below:—

A. Drugs that act on the perephery of the sensory nerves.—These only refer to common sensory nerves and not those of the special senses. The action of a drug on the tactile sensibility is ascertained by observing, whether it produces after application a diminution of pain if present, or a loss of sensibility, or an increse of sensibility or pain.

1. Drugs that depress the perephery of the sensory nerves.—These may be either **local anodynes** or **local analgesics,** or **local anæsthetics.**

(a) **Local anodynes**.—These can only act when pain is present. They relieve pain by either directly paralysing the terminal ends, or by depressing the nerve-centre as well as the perephery. They are:—

Aconite.
Belladonna.
Veratine.
Carbolic acid.
Chloral.
Menthol.
Acid. hydrocyan. dilute.
Creosote.
Alcohol.
Ether.
Chloroform.
Opium.
Stramonium.
Hyoscyamus
Aromatic oils.
Sodium bicarb.
Cold by ice, &c.
Warmth by fomentation, poultice, &c.

Therapeutics.—In most of the neuralgias, aconite, belladonna, chloral c. camphor, menthol, spray of ether and alcohol, application of aromatic volatile oils are of special service. Morphine hypodermically or endermically removes superficial and deeper pains. Pruritus is relieved by lotions containing carbolic acid, diluted hydrocyanic acid, and sodium bicarbonate.

(*b*) **Local anæsthetics.**—These lessen the tactile sensibility of a surface to which they are applied. In fact, they are also **local anodynes.** They are carbolic acid, cocaine injected hypodermically ; ether, ethyl chloride, methyl chloride when sprayed, and extreme cold.

2. **Drugs that stimulate the perephery of the sensory nerves.**—When the blood-supply of a part is increased by immediate local vascular stimulants (see p. 142), the terminal ends of sensory nerves become irritated giving rise to tenderness and pain (perepheral neuritis). There is no need of mentioning again the list.

Therapeutics.—By stimulating the perephery of the sensory nerves by sinapisms, electricity, extreme heat or cold or local vascular irritants, we can reflexly stimulate the heart and lungs, and can rouse patients from unconsciousness, as that of syncope, opium poisoning, &c. (see counter-irritants p. 144). Pellitory root is sometimes used in anæsthesia of the mouth.

B. **Drugs that act on the perephery of the motor nerves.**—The action of this group of drugs is best exemplified by **urara** a South American arrow-poison. It directly paralyses the the motor terminations in a muscle, if it is soaked in a solution of the poison, or if it is brought to it by the blood.

1. **Drugs that paralyse the perephery of the motor nerves in muscles.**—They are **local motor paralysers** and are :—

Amyl nitrite.
Atropine.
Camphor.
Cocaine.
Conium.
Hydrocyanic acid dil.
Hyoscyamus.
Lobeline.
Methyl brucine.
„ cinchonine.
Methyl morphine.
„ codeine.
„ Nicotine.
„ quinine.
„ strychnine.
Saponine.
Nicotine.
Sparteine.
Stramonium.
Galvanism.

Therapeutics.—Of these, belladonna, conium cocaine are used therapeutically to paralyse, or at least to overcome spasmodic contraction of the sphincter ani, so common in rectal fissures and ulcers. They also depress the sensory terminal ends.

2. **Drugs that stimulate the perephery of the motor nerves in muscles.**—They are **local motor stimulants** and are :—

Aconite.
Pillocarpine.
Nicotine.
Pyridine.
Strychnine. (slightly)
Electricity (faradic).

C. **Drugs that act on the nerve-trunks.**—The trunks of nerves are less affected than the perephery.

1. **Drugs that affect the motor terminal ends and twigs.**—Lead, mercury, arsenic and alcohol, when continued for a long period, produce inflammation, fatty degeneration and other changes in the terminal ends and twigs of the sensory, and motor fibres, especially those of the latter, causing tingling and pain, and later on paralysis of motion and to some extent that of sensation.

2. **Drugs that affect the sensory nerve-trunks.**—Opium is most powerful in this respect. It can arrest the conduction of afferent impulses either at the perephery, the trunk or the

sensorium (see p. 159). Other measures such as pressure, heat, cold, section or stretching of the nerves can remove hypersensibility.

D. **Drugs that influence the spinal cord.**—The cord performs three specific functions, *viz.*—(1) the conduction of (*a*) sensory or afferent, and (*b*) of motor or efferent impressions, (2) the reflex action, and (3) the origination of impulses by special nerve-centres, as the sweat-centres, located in the cord. We do not know much of drugs acting on these normal processes, except what is given below :—

1. **Spinal stimulants.**—These drugs **increase the irritability of the anterior cornua and produce convulsions.** They are.—

Strychnine.
Brucine.
Thebaine.
Ammonia.
Chloroform.
Ether.
Ergot.
Opium.

Of these, strychnine is the most powerful, which in small and moderate doses intensifies the reflex excitability, and in large doses produce tetanus. Opium first stimulates and then depresses

Therapeutics—Strychnine is largely employed in motor paralysis local or general, after the inflammatory stage is passed.

2. **Spinal depressants.**—These **depress or paralyse the activity of the anterior cornua.** They may be either **direct** or **indirect paralysers.**

(*a*) **Drugs which directly depress the reflex movements** are :—

Chloral hydrate.*
Bromides.
Physostigmine.
Chloroform.*
Opium.*
Ether.*
Cannabis Ind.*
Apomorphine.*
Veratrine.*
Emetine.
Alcohol.*
Ergot.
Gelsemium.
Saponine.
Amyl nitrite.
Sodium nitrite.
Camphor.*
Mercury.
Antimony.
Sodium.
Potassium.
Lithium.
Silver.
Arsenic.*
Carbolic acid.*
Zinc.
Turpentine.
Colchicum.

Those with * first excite slightly and then depress.

Therapeutics.—Chloral hydrate, bromides, physostigmine, calabar bean, opium, cannabis Ind, and chloroform or ether inhalation are ordinarily, used to check convulsions, as in tetanus.

(*b*) **Drugs which indirectly depress the reflex movements.**—These act by arresting the circulation of the spinal cord. Aconitine, digitalin, and large doses of quinine are powerful in this respect.

E. **Drugs act on the cerebrum**—The structure of the brain being still more complicated than that of the cord, our knowledge of the pharmacology of this organ is necessarily still more obscure. Although we can influence the functions of the brain more rapidly, yet we cannot localise the action of drugs. However, they are found to obey **two general laws** while acting on the brain, *viz.*—

a. **The law of dissolution.**—This was first described by Jackson, and consists in the progressive action of a drug on the nerve-centres in the inverse order of their development in animal life, *i. e.* those that are the highest and developed last are affected first, and then the next highest, and so on, until the lowest ones are affected. Thus, alcohol paralyses first the highest centres, as of will, intellect, &c., then those of the muscles as is evidenced by staggering gait, and lastly those of the heart and respiration (see Alcohol).

β. **The law of primary stimulation and subsequent depression.**—This is well illustrated by the action of a drug which in small doses stimulates certain functions, and in large doses depresses them Thus, chloroform in the first stage of its action stimulates the motor cells, producing tetanic movements ; but in the later stage, depresses them and causes a relaxation of the muscles.

I. Drugs that affect the functions of the cerebrum or brain.

(*a*) **Cerebral stimulants.**—These excite the functional activity of the brain. If the excitement becomes disorderly so as to lead to incoherence and delirium, they are called **deliriants.** If they produce mirthful and comfortable feelings, they are then known as **exhilarants.** They are :—

Alcohol.
Chloroform.
Ether.
Nitrous oxide.
Belladonna.
Stramonium.
Hyoscyamus.
Cannabis Ind.
Opium.
Camphor.
Tobacco.
Tea.
Coffee.
Coca.
Guarana.
Quinine.
Salicylic acid.
Santonin.

Therapeutics.—Many of these depress after primary stimulation. Some of the above are habitually consumed, *e. g.* tea, coffee, coca, tobacco opium, ganja, and alcohol. Alcohol and opium are very powerful cerebral excitants. In cases of fainting, shock due to accidents to the head, drowning, &c., alcohol, ether, chloroform, and cardiac stimulants become necessary. *Indirect measures*, such as recumbent posture, fresh air, artificial chest movements, flagellation, sinapism, ammonia inhalation, etc. must be employed as well

(*b*) **Cerebral depressants.**—These drugs lessen the functional activity of the brain, and can be classified into (1) **hypnotics,** (2) **narcotics,** (3) **general anodynes,** and (4) **general anæsthetics**

(1) **Hypnotics or soporifics** are remedies which induce sleep. During normal sleep, both arteries and veins remain contracted, and the brain becomes anæmic. Therefore, to produce sleep, we must (*a*) lessen its activity, and (*b*) reduce its circulation. We can do this by **direct** and **indirect measures.**

a. **The direct hypnotics** act by reducing the cerebral metabolic process, either by directly acting on the nerve-cells or affecting them through the circulation. They are :—

Chloral hydrate.
Sulphonal.
Bromides.
Narcotics, (q.v.)
Hyoscyamine
Hyoscine.
Trional.
Paraldehide.
Chloralamide.
Cannabis Ind.
General anæsthetics (q. v.)
Urethane.

β. **The indirect hypnotics** act by drawing the blood away from the brain elsewhere, by increasing the activity of circulation. Thus by the application of a warm poultice to the abdomen, by warm foot-baths, warm drinks, and a warm wet-pack, we can indirectly induce sleep. **Digitalis** is an excellent indirect hypnotic. It acts by increasing the contractile power of the arteries leading to the brain, and thus prevents cerebral vascularity, which so often occurs from simple recumbent position in the enfeebled and atonic conditions of the body.

Therapeutics.—The cause of insomnia must, if possible, be removed. Sleep is better induced by combining the direct with the indirect hypnotics. Chloral hydrate, sulphonal, bromides produce almost natural sleep. Morphine or opium is an excellent hypnotic, if the sleeplessness is due to pain. Toleration is often induced by these drugs. Bomides are indicated when the insomnia is due to overwork, mental worry and anxiety.

(2) **Narcotics**, as Brunton defines, are "substances which lessen our relationship with the external world." Hence, they include (*a*) the *direct hypnotics*, (*b*) the *general anodynes* and (*c*) the *general anæsthetics*. Narcotics induce sleep and relieve pain in moderate doses, but are powerful respiratory and vascular depressants in large doses. The following act as narcotics when given in large doses :—

Opium.
Belladonna.
Hyoscyamus.
Stramonium.
Cannabis Ind.
Alcohol.
Chloral hydrate.
General anæsthetics.

(3) **General anodynes or analgesics.**—These relieve pain by depressing the excitability of nerves or nerve-centres They act by arresting the conduction of afferent impressions either at the seat of origination, in the course of transmission, or at the point where they affect the sensorium. They are :—

Opium
Morphine.
Belladonna.
Atropine.
Butyl-chloral.
Conium.
Hyoscyamus.
Stramonium.
Cannabis Ind.
Hyoscyamine.
Conium.
Chloral.
General anæsthetics (in small doses).
Phenazone.
Phenacetin.
Acetanilide.
Gelsemium.

Of these, the action of opium is most marked. It relieves pain by arresting the afferent impressions on all the points mentioned above. Belladonna does this by depressing the excitability of the sensory nerves, and chloral hydrate, butyl-chloral, gelsemium, etc., by lessening the excitability of the cerebral centres.

Therapeutics.—Direct general anodynes are indicated in cases where pain is so intense as to produce loss of sleep, and to cause disturbance of the whole system. Opium or morphine in a variety of forms can be administered by various routes (see p.p. 103-4) ; the hypodermic method being the quickest and the most powerful. Belladonna in large doses is very useful in urinary colic If we desire to have the anodyne effect produced more completely and quickly, we must use general anæsthetics, as in parturition, severe biliary and urinary colic. Phenazone, gelsemium, butyl-chloral, &c , relieve neuralgias.

(4) **General anæsthetics.**—These drugs abolish consciousness and voluntary action, so that no pain is felt. General anæsthesia can be induced by **indirect** and **direct** measures. Indirectly, it can be done by (1) arresting the cerebral circulation and thereby stopping the metabolism of the nerve-cells, either by the compression or ligature of the carotids, or by the combined pressure over the carotids and vagi ; (2) by diminishing the oxidation of the nerve-cells by increasing the venosity of the blood, as in poisoning by charcoal gas ; and (3) by draining the blood from the head to other parts of the body, as by suddenly lifting a patient to a standing posture after he has been laid flat on the ground. Directly, by the inhalation of chloroform, ether, nitrous oxide and several derivatives of ether and alcohol. These remedies, while acting as direct general anæsthetics, very well illustrate the *two general laws of cerebral pharmacology* already mentioned in page 158.

Therapeutics.—The direct general anæsthetics are given :—

(1) To produce insensibility to pain, as in biliary and renal colic.

(2) To remove consciousness, as in surgical operations.

(3) To relax or remove muscular spasm or activity, as in tetanus, hydrophobia, poisoning by strychnine, and in the reduction of hernia, dislocations and fractures.

(4) To diagnose some obscure diseases, as phantom tumors caused by the contraction of the abdominal muscles.

3. **Drugs that act on the motor centres of the brain.**—The investigation of the pharmacology of drugs on the motor area of the brain is not so difficult. The motor centres being situated on the two sides of the fissure of Rolando, the cortical substance of the motor area is exposed by trephining, and stimulated by faradaic current, before and after the administration of a drug, and the strength of the current necessary to produce a similar movement before and after drugging is noted. Another experiment is to expose the cortex on one side and to estimate the strength of current necessary to produce a convulsion, and then to close the wound and allow it to heal. The animal is then drugged for several weeks, and the corresponding area on the opposite side is exposed, and the strength of current to produce a similar convulsion is noted. From these experiments we have been able to deduce the following results :—

(*a*) *Drugs that depress the excitability of the motor centres* are chiefly the bromides. Alcohol, ether and chloroform also diminish the excitability. Chloral hydrate reduces the excitability for a time.

Therapeutics.—Bromides and chloral hydrate, especially the former, are employed in convulsive disorders, such as epilepsy, hysteria, puerperal eclampsia, infantile convulsions, &c.

(*b*) *Drugs that increase the excitability of the motor centres.*—It is very difficult to say whether these drugs directly act on the motor nerve-cells, or influence them by increasing the venosity of the blood, through their action on the respiratory and circulatory centres. Of this group, strychnine, atropine, physostigmine and absinthe are the most powerful.

F. Drugs that influence the cerebellum.—We know very little of the functions of the cerebellum, except that it maintains a harmonious co-ordination of the muscular movement which maintains the body in a position of equilibrium. Alcohol in large doses causes staggering gait, thickness of speech, and irregular manual movements, thereby illustrating its action on the cerebellum. Apomorphine in toxic doses, does not produce vomiting in animals, but makes them go round and round.

CLASS XII.—DRUGS THAT ACT ON THE EYE.

A. Drugs that act on the conjunctiva. These may be divided into the following groups, according to their local action on this membrane.

Astringents.	**Sedatives.**	**Antiseptics.**	**Irritants.**
Alum.	Cocaine.	Boric acid.	Iodine.
Lead acetate.	Atropine.	Boro-glyceride.	Calomel.
Zinc sulphate.	Opium.	Corrosive sublimate.	Yellow mercuric oxide.
,, chloride.	Belladonna.	Carbolic acid.	
Corrosive sublimate.	Eserine	Potassium permanganate.	Argenti nitrate.
Tannin.	**Anæsthetics.**		Copper sulphate.
Argenti nitrate.	Cocaine.	Quinine.	Jequirity seeds.

Therapeutics.—Cocaine is chiefly used in ophthalmic practice to lessen pain and produce local anæsthesia. Boric acid is used as an antiseptic wash in conjunctivitis. Astringent collyrium containing zinc sulphate, alum, silver nitrate, tannic acid, etc. reduces the inflammation, but alum and lead acetate are objectionable, as the former may dissolve the corneal cement, and the latter may deposit itself as an insoluble albuminate if there is a corneal ulcer. Calomel is an effective stimulant and absorbent in pustular conjunctivitis. Iodine removes the recent opacity of the cornea. Yellow mercuric oxide ointment (diluted) and copper sulphate are good applications for granular lids. Tannin removes pannus.

B. Drugs that act on the lachrymal glands.—Local irritants and pilocarpine increase the flow of tear. Prolonged use of atopine lessens it.

C. Drugs that act on the pupil—Iris is the regulator of the pupil. It is composed of two sets of muscular fibres, the circular which contract, and the radiating which dilate the pupil. The sphincter iris (circular fibres) is innervated by the third nerve, and the centre of the contraction of the pupil is located in the corpora quadrigemina. The stimulation of the third contracts, and its section dilates the pupil. The cervical sympathetic is the nerve of the radiating fibres. Its stimulation causes dilatation, and its division contraction of the pupil. The cilio-spinal centre controls dilatation.

1. **Drugs that act on the iris.**—

(a.) **Drugs that dilate the pupil** are called **mydriatics or pupil-dilators.** They act :—

(1) *By paralysing the terminal ends of the third nerve.*—As atropine, homatropine, daturine, hyoscyamine, conine, gelsemine, aconite, amyl nitrite, muscarine and hydrocyanic acid. The action of the last five is rather doubtful.

(2) *By stimulating the terminal ends of the cervical sympathetic.*—As cocaine.

(3) *By stimulating the sympathetic centre*—As anæsthetics in the later stage of their action.

Many of them such as atropine, daturine, hyoscyamine act locally as well as when given by the mouth.

(b.) **Drugs that contract the pupil** are called **myotics** or **pupil-contractors.** They act :—

(1). *By stimulating the terminal ends of the third nerve.*—As pilocarpine and nicotine (?)

(2). *By stimulating the sphincter iris.*—As physostigmine.

(3). *By stimulating the centre of contraction.*—As opium and general anæsthetics in the early stage of their action.

Some of the myotics, such as physostigmine contract the pupil if locally applied, and when introduced into the circulation.

Therapeutics.—The mydriatics are used (1) to break down or prevent adhesions of the iris, as in iritis ; (2) to prevent prolapse of the iris, or to restore it to its normal position if already prolapsed in corneal perforation ; and (3) to dilate the pupil for ophthalmoscopic examination. The myotics (especially eserine) are used (1) to counteract the effects of mydriatics ; (2) to prevent much light entering the pupil ; and (3) to lessen intra-ocular tension in glaucoma

D. **Drugs that act on the ciliary muscle.**—This muscle adjusts the lens for distant and near objects of vision. During rest, the lens remains flattened, but to see nearer objects, it becomes more convex by the contraction of the circular fibres by drawing in the ciliary processes. It is innerved by the third nerve.

1. **Drugs that impair the accommodation of the lens.**—Drugs which affect the iris, influence also the accommodation. Both mydriatics and myotics do this.

2. **Drugs that affect the intra-ocular tension.** They are of two kinds.—

(*a*) *Drugs that increase the tension* are atropine, hyoscyamine, and daturine in large doses.

(*b*) *Drugs that diminish the tension* are cocaine, physostigmine and hyoscine.

E. **Drugs that affect the sensory apparatus of the eye.**—Strychnine increases the sensitiveness to impressions and capacity for seeing blue. Santonin affects the sense of color, objects appearing first as violet and then yellow.

F. **Drugs that produce subjective sensation of sight.**—Cannabis Ind. produces pleasant and laughable visions in some persons. Alcohol in toxic doses induces visions of a disagreeable nature (delirium tremens). Sodium salicylate does the same. Quinine, tobacco and lead cause a failure of sight for form and certain colors.

G. **Drugs that act on the ocular muscles.**—Gelsemium causes paralysis of the ocular muscles, particularly the levator palpebræ and rectus externus. Conine causes ptosis and cocaine protrusion of the eye-ball.

CLASS XIII.—DRUGS THAT ACT ON THE EAR.

A. **Drugs that act on the aural mucous membrane.**—These may be classified into **local anodynes** or **local sedatives, local astringents, local antiseptics** and **emollients.** To relieve pain due to catarrhal inflammation of the mucous membrane, we use opium, morphine, belladonna, atropine, chloral c. camphor, warm boric acid lotion, cocaine (alkaloid) dissolved in warm oil, &c. In otorrhœa, lotions containing boric acid, potassium permangate, zinc sulphate should be injected, and powdered boric acid and iodoform separately or mixed together insufflated. Glycerin acid. tannic sometimes does more good than many antiseptic injections. For the dryness of the membrane, glycerin and bland oils are serviceable.

B. **Drugs that act on the cerumen.**—An accumulation of wax sometimes gives a lot of trouble. Syringing the ear with plain warm water, or a warm solution of sodium bicarbonate (grs. 10 to 1 oz.) greatly assists the removal.

C. **Drugs that affect the sense of hearing.**—Strychnine increases the excitability of the auditory nerve or the auditory centre, thereby increasing the acuteness of hearing. Quinine and salicylic acid create subjective noises, such as ringing, buzzing, &c., which can, to a great extent, be removed by hydrobromic acid dilute. Ergot sometimes removes them.

CLASS XIV.—DRUGS THAT ACT ON THE GENERATIVE SYSTEM.

A. **Drugs and agents which increase the sexual passion and power** are called **aphrodisiacs.** These may be **direct** and **indirect**. True genital centre being situated at the lumbar portion of the spinal cord, can normally be excited by various afferent impressions brought from various sources, such as eye, nose, ear, mamma, rectum, bladder, prostate, nates, cerebrum and general surface of the body. Drugs can stimulate this centre in the following ways :—

1. **Direct Aphrodisiacs** act :—

(*a*) *By increasing the excitability of the nerves passing to or from the genital organs, or of the genital centre* ; as strychnine, nux vomica, damiana and probably phosphorus.

(*b*) *By stimulating the cerebrum and reflexly the genital centre ;* as opium, cannabis Ind., camphor, and alcohol in small doses.

(*c*) *By irritating the nerves of the urinary, genital and adjoining structures and thereby reflexly the genital centre ;* as cantharides and blatta orientalis.

2. **Indirect Aphrodisiacs.**—They act by removing constitutional disorder and improving general health. Thus, by curing diabetes, albuminuria, gout, chronic malarial fever, &c., we improve sexual power. Iron, general tonics, alteratives, generous diet especially meat, indirectly act as aphrodisiacs by improving general health.

Therapeutics.—In functional impotency, both the direct and the indirect aphrodisiacs should be used. Of the direct ones, strychnine, phosphorus, and damiana are reliable and useful. Cantharides should be used with great caution.

B. **Drugs that diminish the sexual passion and power** are called **anaphrodisiacs.** They may also act *directly* and *indirectly.* Thus :—

1. **Direct Anaphrodisiacs** may act :—

(*a*) *By lessening the excitability of the nerves of the genital organs ;* as by the local application of ice and cold bath, bromides.

(*b*) *By depressing the excitability of the genital centre ;* as by bromides, iodides and conium ; opium, hyoscyamus, belladonna and stramonium in large doses.

(*c*) *By reducing the circulation of the genital organs or the lumbar portion of the cord ;* as by ergot and digitalis.

(*d*) *By depressing or removing afferent impulses which reflexly excite the genital nerves and genital centre.*

2 **Indirect Anaphrodisiacs** are measures of a moral and hygyienic nature, such as exercise of the upper limbs, meagre and vegetable diet, avoidance of stimulants, of warm heavy clothing, of feather bed, of obscene works, of amorous songs, of distension of the bladder, of fæcal accumulation, and removal of ascarides and of uric acid crystals from the urine.

Therapeutics.—When the sexual passion is abnormally excited, we use both direct and indirect anaphrodisiacs, but the cause of excitement should be looked for and removed. Large doses of bromides are very useful in satyriasis and nymphomania.

C. Drugs that act on the uterus.

1. *Drugs which cause expulsion of the contents of the uterus* are called **ecbolics** or **oxytoxics**. They act by contracting the unstriped muscular fibres of the uterus ether **directly** or **indirectly**. The direct ecbolics are :—

Ergot.
Quinine.
Savin.
Rue.
Hydrastis.
Borax.
Drastic purgatives. (indirectly)

Of these, ergot is the most powerful. The action of quinine is uncertain. It generally intensifies and increases the labor-pains. The writer has seen a female who took about 6 drs. of quinine within one week to induce abortion without any effect. All direct ecbolics act as emmenagogues in moderate doses.

2 *Drugs which increase or restore the menstrual flow* are called **emmenagogues**. They may be either **direct** or **indirect**.

(a) **Direct emmenagogues** act by gently stimulating the non-gravid uterus and thus increasing the menstrual flow :—

Ecbolics (in small doses).
Asafetida.
Myrrh.
Guaiacum.
Cantharides.
Apiol.

(b) **Indirect emmenagogues** act (1) by improving the quality of the blood, *e. g.* iron, manganese and cod liver oil ; (2) by improving the tone of the nervous system, *e.g.* nux vomica and strychnine ; (3) by increasing the vascularity of the uterus ; *e.g.* hot hip-bath, hot mustard-bath (see p.p. 64-5), mustard poultices and leeches to the thighs and genitals ; (4) by irritating the adjacent organs or structures and thereby reflexly stimulating the womb, *e.g.* aloetic purgatives ; and (5) by removing or neutralising any specific poison, as of malaria by quinine and iron.

Therapeutics.—The cause of the suppression of the menstruation should be looked for and removed. If it is due to a sudden chill, aconite and hot hip-baths are very useful. If it is due to anæmia, iron is the best remedy. Delayed or absent flux is restored by permanganate, aloes and myrrh. Sometimes stronger emmenagogues, such as ergot, savin become necessary.

3. *Drugs which depress the uterine contraction* are sometimes called **uterine sedatives or depressants**. As opium, vivurnum prunifolium, cannabis Indica, chloral, bromides, tartarated antimony.

D. Drugs that act on the mammary glands.

1. *Drugs which increase the secretion of the milk* are called **galactagogues** ; as jaborandi, local application of the leaves of castor-oil plant to the breasts, and alcohol. The action of alcohol is very feeble.

2. *Drugs which decrease or stop the secretion of the milk* are called **antigalactagogues** ; as belladonna either applied locally or given internally.

3. *Drugs which alter the composition of the milk.*—

Several drugs are eliminated by the milk and affect suckling babes.

Thus, rhubarb, senna, jalap, sulphur, scammony, castor-oil may produce looseness in children, when given to their mothers. By giving mercury, iodides, iron and arsenic to the nurse we can affect her infant. Opium should never be given to the nursing mothers. Acids given to the mother may cause griping to her child. Copaiba, garlic, and oil of turpentine impart a disagreeable flavor to the milk (see p. 119). Salts increase the saline ingredients of the milk.

CLASS XV.—DRUGS THAT ACT ON MICRO-ORGANISMS OR THEIR LIFE-PROCESSES IN AND OUTSIDE THE BODY.

A. **Antiseptics** are substances which prevent or retard putrefactive changes, *i.e.* decomposition of vegetable or animal bodies. They include the following:—

1. **Disinfectants** are substances which destroy those micro-organisms *i.e.* the noxious agents which cause communicable diseases.

The following table quoted from the *Pharmaceutical Formulas* will show the quantities per thousand, required to prevent the growth of common micro-organisms in culture media, allowing two days' contact at the normal temperature:—

Mercuric iodide	0.025	Oil of cloves	3.60
Silver iodide	0.03	Oil of neroli	3.80
Hydrogen peroxide	0.05	Oil of lemon	3.90
Mercuric chloride	0.07	Aniline	4.00
Silver nitrate	0.08	Oil of lavender	4.20
Osmic acid	0.15	Alum	4.50
Chromic acid	0.20	Oil of cinnamon	4.50
Iodine	0.25	Tannic acid	4.80
Chlorine	0.25	Eucalyptus oil	4.80
Hydrocyanic acid	0.40	Oil of rosemary	4·80
Bromine	0.60	Oil of turpentine	5.50
Chloroform	0.80	Camphor	5.50
Copper sulphate	0.90	Arsenious acid	6 00
Salicylic acid	1.00	Boric acid	7.50
Benzoic acid	1.10	Sodium arseniate	9.00
Potassium bichromate	1.20	Chloral hydrate	9.30
Potassium cyanide	1.20	Sodium salicylate	10.00
Picric acid	1.30	Iron sulphate	11.00
Ammonia gas	1.40	Amylic alcohol	14.00
Aluminium chloride	1.40	Ether	22.00
Zinc chloride	1.90	Calcium chloride	40.00
Lead chloride	2 00	Borax	70.00
Mineral acids	2 to 3	Alcohol	05.00
Oil of bitter almonds	3.20	Barium chloride	95·00
Oil of thyme	3.20	Potassium sulphocyanide	120.00
Carbolic acid	3.20	Potassium iodide	140.00
Oil of cumin	3.30	Potassium cyanide	150.00
Oil of peppermint	3.50	Sodium chloride	165.00
Potassium permanganate	3.50	Glycerin	225.00
Lead nitrate	3.60	Sodium hyposulphite	275.00

From the above table, it will be seen that hydrogen peroxide, mercuric chloride, silver nitrate, chromic acid and copper sulphate are very powerful. It is doubtful whether any antiseptics taken in medicinal doses can destroy the micro-organisms within the body, though many of them are used for this object (see p.p. 125 and 131).

2. **Deodorants** or **deodorizers** are substances which destroy offensive or disagreeable odors. Many antiseptics more or less can remove bad smells, but potassium permanganate, iodoform, dry charcoal and oils do this better.

3. **Antizymotics** are substances which prevent fermentation. The term is rarely used now.

B. **Antiparasitics** or **paraciticides** are substances which kill parasites infesting the surface of the body. The drugs which act on intestinal parasites are called **anthelmintics** (see p. 131).

These drugs may again be subdivided according to their actions on the different varieties of parasites. Thus we apply for :—

(1) **Tinea and its varieties** ; mercurial ointments (see p. 60), iodine, carbolic acid (glycerin), pyrogallic acid, salicylic acid, boric acid, thymol, sulphurous acid, formalin, chrysarobin, and local irritants, such as croton oil, cantharides, &c.

(2) **Scabes or itch** ; ung. sulph., sulphur fumigation, storax, Peruvian balsam and sandal-wood oil.

(3) **Pediculi capitis and pediculi pubis**, or **head or bodylice** ; mild mercurial ointments, as ung. hydrag. ammon., ung. staphisagriæ, ung. cocculus indicus (*kâkmâri* ointment).

(4) **Pediculi vestimenti** or **wolly lice** ; same as (3).

C. **Antiperiodics** are drugs that prevent the recurrence of certain diseases, which tend to return periodically. They probably act by destroying the specific micro-organisms, *e.g.* the malarial parasites causing ague. They are:—

Quinine and its salts.
Euquinine.
Cinchonine.
Cinchona febrifuge.
Arsenic.
Salicin.
Salicylates.
Nim-bark.
Beberine.
Atis (root of *Aconiti Heterophylli*).
Rasot.
Eucalyptus.
Iodine.
Ammonium picrate.
Piperine.
Methylene blue.
Warburg's tincture.
Kurchicine.

Of these, quinine salts, euquinine, arsenic, ammonium picrate, methylene blue are successful in most cases.

Therapeutics.—Most of them are given in intermittent fever and intermittent neuralgia. Beberine has been found to be an effective remedy in malarial fevers of pregnant females. Rasot—extract of the bark of *Berberis Asiatica*, and *B. Lycium*, give good results in chronic malarial fever of children with a hepatic derangement. Warburg's tincture is not used now. Kurchicine an alkaloid from the bark of *Wrightia antidysenterica* or *Holarrhena* *antidysenterica* is a valuable remedy for chronic dysentery accompanied with malarial fever. The writer has used it in many cases and is satisfied with the result. A few cases and a summary of its chemistry were in 1880 published by the writer in the *Calcutta Medical News* (defunct), when he was the editor of it.

ADDENDUM.

The following will go to page 18 above **Chartæ.**—

Acidum Aromaticum. Aromatic Acid. An acid liquid containing aromatic substances. There is only 1 preparation in the B. P. :—

Acidum Sulphuricum Aromaticum. *Syn.*—**Elixir of Vitriol.**—Mix gradually sulphuric acid 3 ozs. with alcohol 90 p. c. 29½ ozs , and add tincture of ginger 10 ozs. and spirit of cinnamon ½ oz. *Dose.*—5 to 20 ms.

Adeps and **Adeps Lanæ. Lard** and **Wool fat.**—They are 2 in number.—

Adeps Benzoatus.—Prepared lard 16 ozs., powdered benzoin 210 grs. Melt lard on a water-bath and mix and strain.

Adeps Lanæ Hydrosus. Lanoline.—Wool fat 7, distilled water 3. Mix by trituration in a warm mortar

PART V.

MATERIA MEDICA AND THERAPEUTICS.

(In this part, all the official remedies proper including their chief non-official preparations and derivatives will be described. The pharmacopœial or the alphabetical arrangement of drugs will be followed, but the composition of their official preparations will not be repeated, (see p.p. 15—61), except their strengths, doses, and in some instances, their actions, uses and special characteristics.)

ACACIÆ GUMMI. Gum Acacia. N.O. *Leguminosæ.*

Synonym Indian Vernacular.—*Gand*, Beng. *Bábul-ká-gand*, Hind.
Habitat.—Kordofan.

Source.—A gummy exudation from the stem and branches of *Acacia senegal*, and of other species of *Acacia.*

Characters—Ovoid or round tears or masses, colorless, glistening or yellowish angular fragments ; odorless ; taste mucilaginous. *Solubility.*—Entirely in water, insoluble in alcohol. *Impurities.*—Starch, dextrin, tannic acid, sugars, mineral matters, and inferior gums of many species of *acacia* and of other plants found in India.

Composition.—*Arabin* or arabic acid, combined with calcium, potassium and magnesium.

Incompatibles.—Alcohol, sulphuric acid, persalts of iron, borax, and lead acetate. The last three render it gelatinous (see p. 81).

Action.—Demulcent, emollient.

Enters into—Pulv. Amyg. Co., Pulv. Tragac. Co., Pil. Ferri, Pil. Phosph. and all Trochisci, and the

Official Preparations.

1. **Mucilago Acaciæ.**—4 and 6. *Dose.*—1 to 4 drs.
Enters into.—The preparation of Lozenges, Jujubes, Pastils, and Mist. Ol. Ricini.

2. **Decoctum Acaciæ Corticis,** (*Ind. and Col. Addendum*).—(*Báblá Chhál*, Beng. *Bábulká Chhál*, Hind.) The dried bark of *Acacia arabica* and *Acacia decurrens* contain about 20 p.c. of tannic acid. 1½ oz. to 24 ozs. of water, boiled for 10 minutes. May be used as an astringent injection and gargle, and in 1 to 2 oz. doses in diarrhœa.

Pharmacology and Therapeutics.

Gum acacia is feebly nutritive, being converted into sugar in the intestine. It is given as an **emollient** in sore throat, catarrhal state of the gastric, intestinal and bronchial mucous membranes ; and as a **demulcent** in irritant poisoning. It is a **reflex expectorant.** In Pharmacy, it is chiefly used to suspend insoluble powders, resins, oils, and as an excipient for pills, jujubes, &c.

ACALYPHA. Acalypha. N.O. *Enphorbiaceæ.*

(*Ind. and Col Addendum*).

Syn. I.V.—*Muktabarshi*, *Muktajhuri*, Beng. *Rupi*, *Kokli*, *Hind.* Bom.

Source.—The fresh and dried herb, *Acalypha indica.*

Characters.—An annual plant. Stem erect, 1 to 2 ft. high ; leaves ovate-cordate, serrated. Spikes axillary. Male flowers uppermost enclosed in a funnel-shaped involucre. Stamens 8 to 16 ; styles 3 ; capsules tricoccus, three-celled, one-seeded. Flowers small, green.

OFFICIAL PREPARATIONS.

1. **Extractum Acalyphæ Liquidum.**—Dried herb 20 ozs. Alcohol 90 p.c. *q.s.* to produce 1 pint by percolation. **B.P. Dose** —5 to 30 ms.
2. **Succus Acalyphæ.**—Expressed juice 3, Alcohol 90 p.c. 1. Filter after 7 days. **B.P. Dose.**—1 to 4 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The fresh juice is a **stimulant expectorant, emetic** and **laxative**, used in bronchitis and croup of children. Its emetic action is considered to be a valuable addition, being safe, speedy and certain in its operation. It produces loose bilious stools, especially, if the root bruised with water is administered. A thick paste introduced into the rectum, after the manner of a suppository opens the bowels nicely.

It is doubtful whether the dried herb possesses the same virtues as the fresh one.

ACETANILIDUM. Acetanilide. $CH_3 \cdot CO\ NH \cdot C_6H_5$.

Syn. B.P.—Phenyl-acetamide, commonly known as "Antifebrin."

Source.—Obtained by the interaction of glacial acetic acid, and aniline and purification.

Characters.—Colorless, inodorous, glistening, lamellar crystals ; taste pungent. Melts at 236·5° F. *Solubility.*—1 in 200° of cold, 1 in 18 of boiling water, freely in chloroform and ether. *Impurities.*—Acetone, phenazone, free acid and salts of aniline.

Action.—Powerfully antipyretic, analgesic. **B.P. Dose.**—1 to 3 grs. *Single Maximum Dose.*—8 grs. *Daily Dose.*—40 grs.

Prescribing hints.—In cachets, in diluted brandy or wine, or suspended in water by Pulv. Tragacanth. Co.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Ammonol**, *Syn.—Ammoniated Phenylacetamide.*—A white powder sparingly soluble in water, containing equal parts of Ammonium Carbonate and Acetanilide. *Dose.*—5 to 20 (?) grs.
2. **Antikamnia.** *Syn.—Pulv. Acetanilid Co. B.P.C.*—An American speciality containing about Acetanilide 70, Caffeine 10, and Sodium Bicarbonate 20. *Dose.*—3 to 5 grs. Used in headache.
3. **Antinervin.** *Syn.—Salbromalid.*—A mixture of Salicylic Acid, Potassium Bromide and Acetanilide. *Dose.*—3 to 5 grs.

4. **Antisepsin.** *Syn.—Monobromacetanilide.*—White acicular crystals. Suggested for facial neuralgia and neuritis. *Dose.*—3 to 15 grs.

5. **Salefebrin.** *Syn.—Salicylanilide.*—A white powder insoluble in water. Acts like a concentrated salicylic acid. Used in acute rheumatism and migraine. *Dose.*—5 grs.

PHARMACOLOGY AND THERAPEUTICS.

Same as those of phenazonum and phenacetinum. *(q. v.)*

ACIDUM ACETICUM. Acetic Acid.

Hydrogen Acetate. $CH_3{\cdot}COOH$. 33 p.c. by weight in water.

Source.—Prepared by the destructive distillation of wood, or by the oxidation of ethylic alcohol.

Characters.—A colorless acid liquid with a pungent odor. Sp. gr. 1·044. *Impurities.*—Copper, lead, arsenic, and sulphuric, nitric, hydrochloric and formic acids.

Identification.—The peculiar vinegar smell is characteristic.

Action.—A local stimulant and irritant, refrigerant, sialagogue and antiseptic.

Enters into.—Oxymel, Oxymel Scillæ, Liq. Ammon. Acetat., Liq. Morph. Acet., many Acetates, and the

OFFICIAL PREPARATION.

1. **Acidum Aceticum Dilutum.**—1 in 8 or 4·27 p.c. of hydrogen acetate. Refrigerant, diuretic. **B.P. Dose.**—½ to 2 drs.

Enters into.—Acet. Ipecac., Acet. Scillæ, and Liqr. Morph. Acet.

ACIDUM ACETICUM GLACIALE. Glacial Acetic Acid.

Source and Characters.—A concentrated, colorless liquid, with a very pungent odor, containing 99 p.c. of hydrogen acetate. Crystallises below 60° F. Sp. gr. 1.058. *Solubility.*—Freely in water and absolute alcohol. *Impurities.*—The same as those of acetic acid.

Action.—Escharotic.

Enters into.—Acet. Canth., Lin. Terebinth. Acet. and Liq. Ferri Acet.

NON-OFFICIAL PREPARATION.

1. **Acetum. Vinegar.**—Contains 5.41 p.c. of hydrogen acetate. An acid liquid obtained by the acetous fermentation of malt and unmalted grains. *Dose.*—1 to 8 drs. Country vinegar (*sirká*) is made from the saccharine juice of plants.

PHARMACOLOGY AND THERAPEUTICS.

The action of acetic acid resembles more or less that of the mineral acids.

Externally :—Glacial acetic acid is a **caustic** and is therefore used in destroying **corns, warts** and small **cancerous growths.** It speedily **vesicates,** and may be used in those cases where cantharides cannot be employed, but it causes much pain, and if not cautiously applied, may produce a nasty sore. Its (*aromatic vinegar*) inhalation reflexly stimulates the vaso-motor centre and increases blood-pressure, and is useful in **syncope** and **cardiac depression**.

Acetic acid destroys **tinea**, and is an effective application for ringworm. Vinegar or diluted acetic acid is an **External refrigerant**, and may be used as a **cooling lotion** in **cerebral congestion, sprains** and **bruises**; and may be sponged on the skin to **reduce pyrexia** and to **check excessive sweating**. Vinegar is sometimes used topically to check **post-partum hæmorrhage, epistaxis**, &c.

Internally :—Diluted acetic acid **allays thirst** by increasing the salivary secretion, hence its **gargle** (15 ms. to 1 oz.) may be employed in cases where dryness of the mouth is a troublesome symptom.

After a prolonged use, it diminishes the number of red blood corpuscles, and therefore, its employment in **obesity** is contra-indicated. As an internal refrigerant, it may be given in **fevers cholera, diabetes, Bright's disease**, &c.

Acetic acid is excreted in the urine as a carbonate. Given in large doses, it passes out unchanged.

Antidotes.—The same as those of the mineral acids. No stomach pump.

Prescribing hints.—Used diluted with water. As a caustic undiluted.

ACIDUM ARSENIOSUM. Arsenious Anhydride. As_4O_6.

Syn. B.P.—Arsenic. White Arsenic. Arsenions Acid. **Syn. I.V.**—*Sánkhiá*, Hind. *Sanko*, *Simulakhár*, Beng.

Source.—Prepared by roasting certain arsenical ores.

Characters.—A heavy white powder or in stratified opaque masses. *Solubility*.—1 in 100 of cold, 1 in 10 of boiling water, and 1 in 5 of glycerin. *Impurities*.—Lead, antimony, tin, cadmium, gypsum and chalk.

Identification.—Arsenious anhydride resembles pieces of broken china in appearance. Its white porcelain-like appearance, glassy fracture and weight are characteristic. Its crystals can be identified only after a long practice, but its powder cannot be made out without chemical tests.

Tests.—(1) Its aqueous solution gives a canary yellow pecipitate with silver ammonio-nitrate, readily dissolved by ammonia solution and nitric acid. (2) sprinkled over ignited charcoal emits a garlic-like odor. (3) From organic matters, arsenic is detected by adding HCl and distilling, when the volatile chloride is found in the distillate. (4) Acidulated with HCl, it gives a yellow precipitate with H_2S. (5) Marsh's and Reinsch's special tests.

Incompatibles.—Lime water, iron salts, magnesia, and astringent substances.

Action.—Alterative, tonic, antiperiodic, caustic. **B.P. Dose**.—$\frac{1}{60}$ to $\frac{1}{15}$ gr. *S. M. Dose*.—$\frac{1}{12}$gr. *Daily Dose*.—about $\frac{1}{6}$ to $\frac{1}{4}$ gr.

OFFICIAL PREPARATIONS.

1. **Liquor Arsenicalis**, *Syn.—Liq. Potassæ Arsenitis. Fowler's Solution.*—1 gr. in 110 ms.* Pinkish, *alkaline* with a lavender odor. **B.P. Dose.**—2 to 8 ms. diluted.

Liquor Arsenici Hydrochloricus.—1 gr. in 110 ms. This is 3 times the strength of DeValangin's Solvent. A colorless *acid* liquid. **B.P. Dose.**—2 to 8 ms. diluted.

ARSENII IODIDUM. Arsenious Iodide. AsI_3.

Source and Characters.—Small, soluble, orange-colored crystals, prepared by the direct combination of iodine and arsenium.

Action.—Tonic, alterative, antiperiodic. **B.P. Dose.**—$\frac{1}{20}$ to $\frac{1}{6}$ gr. *S. M. Dose*—$\frac{1}{12}$. *Daily Dose.*—$\frac{1}{3}$ gr., in pill or in solution.

OFFICIAL PREPARATION.

1. **Liquor Arsenii et Hydrargyri Iodidi.** *Donovan's Solution.*—1 gr. in 110 ms. A colorless *acid* liquid. **Action.**—Alterative, antisyphilitic. **B.P. Dose.**—5 to 20 ms.

FERRI ARSENAS. Iron Arsenate. $Fe_3(AsO_4)_2,6H_2O$.

Source and Characters.—A tasteless, amorphous, greenish powder, prepared by interacting ferrous arsenate with ferric arsenate and iron oxide.

Identification.—*Green color* and *amorphous* character help recognition. Be careful not to mistake it for iron phosphate which is *blue.*

Action.—Alterative, tonic like Arsenious Acid. **B.P. Dose.**—$\frac{1}{16}$ to $\frac{1}{4}$ gr. in pill (see pp. 85, 88.)

SODII ARSENAS. Sodium Arsenate. Na_2HAsO_4.

Source and Characters.—A soluble white powder obtained by exposing to 300°F. crystallised sodium arsenate, which may be prepared by treating with water the product of the fusion of arsenious anhydride with sodium nitrate and sodium carbonate. **B.P. Dose.**—$\frac{1}{40}$ to $\frac{1}{10}$ gr. in pill.

OFFICIAL PREPARATION.

1. **Liquor Sodii Arsenatis.**—1 gr in 110 ms. (Pearson's Solution is 1 in 600). A *colorless* solution having half the strength of Liq. arsenicalis. **Action.**—Produces less gastric irritation. Cures eczema readily.

NON-OFFICIAL PREPARATIONS OF ACIDUM ARSENIOSUM.

1. **Abernethy's Lotion.**—Liq. Arsenicalis 2 drs. to water 1 oz.
2. **Arsenical Cigarettes.**—Each contains $\frac{3}{4}$ gr. of Sodii Arsenas. The smoke is to be inhaled deeply 3 or 4 times.
3. **Cupri Arsenis.**—A pale-green amorphous powder. Useful in cholera, diarrhœa, dysentery, enteric fever in $\frac{1}{5000}$ to $\frac{1}{3000}$ gr. every 10 minutes for one hour, and then hourly for adults. For anæmia, chlorosis $\frac{1}{30}$ to $\frac{1}{25}$ gr. thrice daily.

---

* 1 gr. in 110 ms. is equivalent to 1 gr. in 100 fluid grains.

4. **Liq. Arsenici Bromatus. Clement's Solution of Arsenite of Bromine.** Useful in diabetes and epilepsy. *Dose.*—1 to 5 ms.

5. **Liq. Auri et Arsenii Bromidi, N.F.**—Acid Arsenious 2·5 grm., Tribromide of Gold 3·25 grm., Bromine Water *q. s.*, Distilled Water *q. s.* to 1,000 C.C. In syphilis, neurasthenia. *Dose.*—1 to 2 ms.

6. **Pasta arsenicalis** (dental).—Arsenic 4, Cocaine Hydro. 4, Menthol, Glycerin *q.s.* M. The size of a pin-head is to be put into the cavity of the tooth and plugged, to destroy the dental nerve.

7. **Pasta Arsenici Escharoticus.**—Arsenic 1, Charcoal 1, Red Sulphide of Mercury 4, Aquæ *q.s.* To destroy lupus, epithelioma, &c.

8. **Sodium Kakodylate** has been lately much praised especially in France for the treatment of anæmia due to various causes, phthisis, neurasthenia, diabetes mellitus, &c. It is a sodium compound of kakodylic acid which contains a large proportion of arsenic, and it is said that by means of this very large doses of arsenic can be given with safety and benefit. The salt is very deliquescent but can be given in perles or hypodermically. Pure kakodylic acid is very poisonous and has the characteristic odour of arseniuretted hydrogen. *Dose* —$\frac{1}{12}$ to $\frac{1}{6}$ gr.

9. **Pilula Asiatica** (Codex).—Acid Arsenious $\frac{1}{13}$ gr., black-pepper $\frac{3}{4}$ gr., Acacia *q.s.* M. In many chronic skin diseases. *Dose.*—1 to 2 daily.

10. **Unguentum Arsenicalis** (Sir A. Cooper's).—Acid Arsenious 1 dr., Sulphur 1 dr., Spermaceti Ointment 1 oz. Applied for 24 hours.

PHARMACOLOGY.

Externally.—Arsenic has no action on the unbroken skin, but on the denuded surface it is a powerful **irritant and Caustic.** Unless applied in a concentrated form, poisoning may take place from absorption.

Internally. **Alimentary tract.**—In minute doses $\frac{1}{60}$ to $\frac{1}{50}$ gr., it increases the gastric vascularity and secretion, and thus improves appetite and digestion. It is therefore a **local gastric stimulant** and **stomachic** In large doses, it is a powerful **gastro-intestinal irritant.** It is excreted into the stomach after absorption, even when subcutaneously injected.

Blood.—It is quickly absorbed, and has no action on the blood, except in certain varieties of anæmia, where it increases the hæmoglobin and the number of red corpuscles.

Heart and circulation.—In very small doses ($\frac{1}{2}$ to 1 m. of the solution), it increases the force and the number of cardiac beats. In large doses, it reduces blood-pressure and pulse-rate.

Metabolism.—Arsenic passes through all the organs and tissues, and is not known to combine with their albuminous constituents, though Dogiel says it does. During its brief stay in the tissues, it performs certain important functions. According to Binz and Schulz, it is a carrier of oxygen, which it receives and gives up, by the transformation of arsenious into arsenic acid at the expense of the oxygen of the protoplasm, and by the reduction of arsenic into arsenious acid by the venous and capillary blood. In the liver, it reduces the formation of glycogen, and produces when continued long a fatty degeneration. In other organs, it behaves in the same way, by interfering with their metabolic processes, and helping the deposition of fat. Short of this action, it **stimulates the general metabolism** of all organs and tissues, and **alters** their activity in such a subtle way, that many abnormal conditions of the system due to faulty nutrition are benefited Therefore, it is a **general tonic** and **alterative.**

Respiration.—We do not know much of its action on respiration, except that the habitual eaters of arsenic, such as the Styrian peasants, can undergo great bodily exertion without much difficulty and distress of breathing.

Nervous system.—In minute doses, it acts as a **nervine tonic.** In larger doses, it diminishes the sensibility and reflex excitability of the centres, and is found in the grey matter of the cord. Motor nerves and muscles are affected later on (peripheral neuritis).

Skin.—It is eliminated with the sweat, and causes itching and **eruptions,** which may be erythematous, papular, pustular, furuncular, pigmentary or urticarial. The skin of a frog poisoned by arsenic can be stripped off easily.

Bone —Like phosphorus, it increases the compact tissue at the expense of the medullary.

Micro-organisms.—It is believed to affect the life-processes of the micro-organisms of certain diseases, such as malaria, phthisis, &c.

Elimination —It is excreted chiefly in the urine as arsenious acid, also in the bile, sweat, saliva, tears and gastro-intestinal secretion except milk.

Toleration can be induced, though instances of death from an over-dose are not infrequent.

Acute toxic action.—Colicky pains, severe vomiting and purging, cramps of the legs, intense thirst, prostration and collapse are the prominent symptoms, which may be mistaken for those of cholera. At the *post mortem*, the stomach and intestine are found inflamed with occasional patches of softening of the mucous membrane *Fatty degeneration of the liver, kidneys and heart* is found if the patient survived long. Sometimes, there may not be any gastro-intestinal irritation, death taking place during a profound coma.

Antidotes.—Emetics, apomorphine, pump with great caution. Moist peroxide of iron prepared afresh by mixing tincture of steel with sodium or ammonium carbonates and straining rapidly through muslin, or dialysed iron in 1 oz. doses diluted, or in their absence, magnesia, animal charcoal, olive oil, lime water freely. Demulcents, and castor oil to clear the intestine, stimulants, hot water bottles, &c.

Chronic toxic action.—Chronic poisoning occurs amongst those who either handle arsenical pigments, inhale arsenical dust from wall-paper, dresses, &c., or consume wines* containing traces of arsenic.

---

* Most of the neurotic symptoms were observed in an epidemic of arsenical bear poisoning, that recently prevailed in England. A case is also reported by Dr. A. Buchanan from Nagpur.

Loss of appetite, nausea, vomiting, colic, mild diarrhœa, œdema of the lower eye-lids, conjunctivitis, swelling of the joints are the symptoms generally observed, when arsenic is continued long medicinally in large doses. Perepheral neuritis, muscular paralysis of the limbs, ataxic gait, muscular atrophy, bronzing of the skin and darting pains in the limbs are also noticed in many cases of slow poisoning.

THERAPEUTICS.

Externally.—An arsenical paste is used for destroying superfluous new growths, such as **lupus, condyloma, epithelioma,** &c., but it must be concentrated, and only a limited surface is to be treated, if the disease is extensive. The cancer-curers of North Ireland use arsenic as the chief basis of their remedy. Small **warts,** and **corns,** after the paring of the hard skin, can be removed by the painting of Liquor Arsenicalis. Arsenical cigarettes are sometimes smoked for the relief of **asthmatic fits,** and **phthisical dyspnœa,** but such inhalation must be given with caution.

Internally. **Gastro-intestinal tract.**—Dental arsenical paste is employed to destroy the tooth-pulp in **caries** of the tooth, before stopping. In minute doses before meals, arsenic may be given in **irritative dyspepsia, vomiting of habitual drunkards, vomiting** or **diarrhœa** excited by food, **gastric neuralgia** and **chronic ulcer** and **cancer of the stomach.** For other diseases of the alimentary tract, such as **cancrum oris** and **malignant sore throat,** it is given after food.

Heart and lungs.—In minute doses ($\frac{1}{4}$ to 1 m. of the solution), it **tones** up the heart in **angina** and exhausting febrile and other diseases. It checks the repetition of **asthmatic fits,** if continued long. It gives signal benefit in paroxysmal **coryza, hay-asthma** and wheezing of **emphysema, spasmodic bronchitis** and **chronic catarrhal pneumonia.** According to Brunton, it arrests **incipient phthisis,** by the degeneration of the inflammatory nodules, and thereby preventing the bacillus from finding a suitable nidus.

Malaria.—It is both curative and prophylactic in malarious diseases, such as **ague** and **intermittent neuralgia.** A few cases of **relapsing fever** have yielded to arsenic in the writer's hands. In chronic malarious fever, it must be given in pretty large doses ($\frac{1}{24}$ to $\frac{1}{12}$ gr.). The writer considers arsenic to be a useful remedy for arresting the paroxysmal febrile attacks of **elephantiasis arabum,** but it must be continued from 18 to 24 months, for one of his patients got a relapse after 1 year's treatment.

Nervous system.—In large doses, arsenic cures **chorea.** Children over 4 or 5 years of age can bear as large doses as adults. Beginning with 5 m. doses, liqr. arsenicalis may be pushed on to 15 ms. 3 or 4 times a day. Sometimes, it soon stops the fits, if it is commenced in 10 to 15 m. doses, twice daily. Gowers speaks highly of it in **locomotor ataxy.** Many other spasmodic diseases, especially **pertussis** and **angina** are markedly benefited by it.

Kidneys.—Dr. Murray strongly recommends arsenic in **diabetes mellitus.** He uses 10 ms. of the solution three times a day for 2 or 3 months, after reducing the sugar by codeine. Occasionally it is prescribed in chronic **Bright's disease.**

Lymphatics.—In **Hodgkin's disease** (general lymphadenoma), no remedy is known to be of any use except arsenic. Large **lymphomas** are said to have been absorbed by the continued use of arsenic internally and hypodermically.

Skin.—Chronic skin diseases, especially **scaly** and **papular** varieties are wonderfully benefited by arsenic. **Psoriasis, lichen, chronic eczema, acne, pemphigus,** &c. yield to it. The writer used it in two cases of true **leprosy** with good result, but they came under his treatment at the beginning of the disease. Within 3 months the eruptions disappeared. **Leucoderma** too is benefited by it.

Caution.—(1) Never use arsenic during the inflammatory stage of of the cutaneous disease.

(2) Use always well diluted after food, except where its local action on the stomach is desired.

(3) Arsenites are more active than arsenates.

(4) As soon as the itching, smarting or irritation of the conjunctivæ, œdema of the lower eye-lids, or neurotic symptoms are noticed, the dose must be reduced to one-fourth or one-fifth. If the irritation does not subside, it must be further diminished.

(5) If the skin becomes irritated, a laxative may be given, rather than the treatment be stopped.

(6) For the radical cure of a chronic skin disease, it must be continued for some months after the final disapearance of eruptions.

(7) Children over 5 years of age, can bear as large doses, as adults.

(8) Old people bear it badly.

Prescribing hints.—Solid arsenic is given in pills, and can be divided as directed in para 12, p. 77. With an alkaline mixture, its alkaline solution should be prescribed, and with an acid one, Liqr. Arsenici Hydrochlor. Sometimes, it is used hypodermically as in multiple sarcomas.

ACIDUM BENZOICUM. See BENZOINUM.

ACIDUM BORICUM. Boric Acid. H_3BO_3.

Syn. B.P.—Boracic Acid. Hydrogen Borate.

Source.—Obtained by the purification of native boric acid, or by the interaction of sulphuric acid and borax.

Characters.—Colorless, pearly, lamellar crystals, unctuous to touch, odorless. Taste slightly acid and bitter. *Solubility.*—1 in 30 of cold water, 1 in 3 of boiling water, 1 in 4 of glycerin, 1 in 30 of alcohol 90 p.c.

which burns with a green flame. The *greasy feel* of the powdered boric acid is to be noted for its **identification.**

Action.—Anteseptic, diuretic. **B.P. Dose.**—5 to 15 grs.

OFFICIAL PREPARATIONS.

1. **Glycerinum Acidi Borici.**—1 in 16 (by vol.). A substitute for Boro-Glyceride. Powerfully antiseptic.
2. **Ungentum Acidi Borici.**—1 in 10. An Antiseptic application.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Boric Collyrium.**—2 to 10 grs. to 1 oz.
2. **Boric Gargle.**—10 to 15 grs. to 1 oz,
3. **Boric Dressings.**—**Boric Gauze.**—20 p.c. **Boric Lint.**—50 p.c. **Boric Lotion.**—1 in 20. **Boric Wool.**—50 p.c.
4. **Boric Pessary.**—10 grs. each.
5. **Boric Suppository.**—3 grs. each.
6. **Branalcane.**—A rose colored compound of Boro-glycerin. An antiseptic pigment in diphtheria, and throat, nose and skin affections.
7. **Boro-glyceride.**—A tough deliquescent mass soluble in water and alcohol, obtained by heating glycerin 92 parts with 62 of boric acid. A patented preparation. Powerfully antiseptic.
8. **Magnesii Boro Citras.**—In white powder or colorless scales. An internal urinary antiseptic. *Dose.*—15 to 30 grs.
9. **Pigmentum Acidi Borici.** *Syn. Solutio Saturans.*—Boric Acid 1, Ether 3, Alcohol 90 p.c. 6. Mix. Used in ringworm, &c.

BORAX. Borax. $Na_2B_4O_7, 10H_2O$.

Syn. B.P.—Biborate of Sodium. **Syn. I.V.**—*Shohágá.* Beng. Hind.

Source.—A native salt, or obtained by neutralising native boric acid with sodium carbonate, or by boiling native calcium borate with solution of sodium carbonate. (Impure borax is largely imported from Nepal.)

Characters.—Transparent, colorless, odorless, efflorescent crystals, with a weak alkaline reaction. *Solubility.*—1 in 25 of cold water, 1 in 1 of glycerin. It gives a yellow color to the flame.

Incompatibles.—Mineral acids, most metallic salts, mucilage of acacia.

Action.—Antiseptic, emmenagogue, diuretic. **B.P. Dose.**—5 to 20 grs.

OFFICIAL PREPARATIONS.

1. **Glycerinum Boracis.**—1 to 6 or 1 in 8½ by weight. *Dose.*—½ to 1½ dr. An external and internal antiseptic.
2. **Mel Boracis.**—1 in 9½. An antiseptic soothing application to inflamed mucous membrane.

NON-OFFICIAL PREPARATIONS.

1. **Lotio Boracis,**—Borax 1, Rose-water 24 ; or Borax 1, Glycerin 1, Rose-water 16. A cosmetic.
2. **Trochisci Boracis, T.H.**—Each contains 3 grs. of borax. Used in thrush.

3. **Tr. Myrrh. et Boracis.**—Myrrh 1, Eau de Cologne 16, Borax 1, Water 3, Syrup 3.

PHARMACOLOGY OF BORIC ACID AND BORAX.

Externally.—Both boric acid and borax are non-irritating and mild **antiseptics, antiputrefactives,** and **disinfectants.** They kill micro-organisms, but their action is entirely local.

Internally. **Gastro-intestinal tract.**—Some authorities affirm that they prevent the conversion of starch by the saliva, while others deny it. At any rate, they do not check the peptonizing action of gastric and pancreatic secretions, but rather stimulate them slightly. In large doses they retard these processes and act as **gastro-intestinal irritants**

Urinary tract—Boric acid is rapidly excreted in the urine, increases diuresis and urea, and **renders the urine acid.** Large doses reduce the acidity. It has a striking influence on the foul decomposing alkaline urine, clearing it by a few doses. It is also **eliminated** by saliva, sweat and fæces.

Nervous system.—They produce a sedative action on the nervous system.

Generative organs.—Borax promotes menstrual flow and uterine contractions, it is therefore an **emmenagogue** and **ecbolic.**

Toxic action or **Borism.**—Poisoning may occur from absorption. Weakness, dryness of the skin, nausea, vomiting, anorexia, red and inflamed mucous membrane, papular and squamous rash on the skin, and albumen in the urine are the chief symptoms.

THERAPEUTICS OF BORIC ACID AND BORAX.

Externally.—Boric acid is used as a food preservative. Being a non-irritatant, it is largely employed in surgical dressings. Its ointment is applied to **wounds, ulcers** and **burns.** As its action is entirely local, its use is of no value in deep suppurating cavities. It is used as an eye-wash in **ophthalmia.** and as an injection in **leucorrhœa., gonorrhœa, ozæna,** (10 grs. to 1 oz.) and **otorrhœa.** The writer plugs the vagina with boric cotton with a lot of boric acid in leucorrhœa, and either injects a saturated warm solution, or insufflates the powder in otorrhœa. In **cystitis,** the irrigation of boric acid (1 in 100) is a capital local application. Thompson's fluid (borax 1 oz, glycerin 2 ozs., and water 2 ozs.) in ½ to 4 ozs. of warm water is also very serviceable in **cystitis. Pityriasis** of the body and scalp, **eczema** of the ear and scalp, and **cracked nipples** are benefited by boric acid applications. Borax (1 dr. to water 4 ozs) removes **prurigo** of the labia and anus. Socks soaked in a warm saturated solution and put on, remove the **fetid perspiration of the feet.**

Internally.—Borax is used as a gargle in **mercurial salivation,** and **aphthous sores** of the mouth. Borax tablets slowly dissolved in the mouth restore **hoarseness**. Borated tincture of myrrh is a valuable local paint for **ulcerated gums**. Glycerin boracis 1 dr., tr. myrrh 10 ms. and water to 1 oz., make a good all-round mouth-wash. Borax is an excellent medicine for **fermentative dyspepsia**, and for disinfecting foul urine. Its efficacy in **diarrhœa** and **dysentery** is doubtful. To clear putrid ammoniacal urine, boric acid is superior to borax, three or four 15 gr. doses rendering it quite clear. Borax is sometimes employed to increase the labor-pains, or to expel the placenta.

Prescribing hints.—The taste is disguised by the syrup of orange peel. The powder may be given in cachets or solution. Borax should not be combined with cocaine or other alkaloids.

ACIDUM CARBOLICUM. Carbolic Acid. C_6H_5OH.

Syn. B.P.—Phenol. Phenic Acid. Phenyl Hydrate. Phenyl Alcohol.

Source.—Obtained from coal-tar oil by fractional distillation and purification.

Characters.—Colorless, acicular, deliquescent crystals, becoming pinkish when exposed to moist air ; odor tarry ; taste sweetish pungent ; melts at 102° F. ; sp. gr. 1·060 to 1·066. *Solubility.*—1 in 30 to 40 of water, freely in glycerin, ether, chloroform, fixed and volatile oils, and alcohol. Does not redden blue litmus paper immediately ; coagulates albumen. *Impurities.*—Aurin or rosolic acid, which gives it a purplish color when exposed, and cresol which gives turbidity to water.

Identification.—By its *peculiar odor*, it can always be made out.

Incompatibles.—Chloral, Ferrous Sulphate.

Action.—Antiseptic, disinfectant, deodorant, local anæsthetic, and caustic.

B.P. Dose.—1 to 3 grs. in pill or mixture.

Enters into.—Inject. Ergot. Hypoderm., Liq. Thyroid., and the

Official Preparations.

1. **Acidum Carbolicum Liquefactum.** Phenol 10, water 1. A colorless liquid becoming pinkish afterwards. **B.P. Dose.**—1 to 3 ms.
2. **Glycerinum Acidi Carbolici.**—1 in 5. by vol.
3. **Suppositoria Acidi Carbolici.**—1 gr. in each.
4. **Trochiscus Acidi Carbolici.**—1 gr. in each. *Dose.*—1 to 3.
5. **Unguentum Acidi Carbolici.**—1 in 25.

Non-official Preparations and Derivatives.

1. **Carbolic Lotion.**—1 to 2 in 40. 2. **Carbolised Oil.**—1 to 9 or more. 3. **Catheter Oil.**—Phenol 1, Castor oil 4, Almond Oil 15. 4. **Hypodermic injection.**—2 p.c. solution. 5. **Deep hypodermic injection.**—$\frac{1}{2}$ gr. in 20 ms. of water, in poisoned wounds or erysipelas. 6. **Spray.**—3 grs. to 1 oz 7. **Inhalation.**—20 grs. in 1 pint.

8. **Antiseptic Carbolic Dressings.**—**Carbolised Wool, Lint, Tow.**—5 to 10 p.c. **Ligatures.**—16 p.c. **Carbolic Gauze** (Lister's).—Phenol 1, Resin 4, Paraffin 4. **Carbolic Soap.**—20 p.c.

9. **Pilula Acidi Carbolici.**—Carbolic Acid 60 grs., Hard Paraffin

12 grs., Wheaten Flour 45 grs., Glucanth 3 grs. Divide into 60 pills. (See p. 87).

10. **Pigmentum Antisepticum** (Sir A. Clark).—Glycerin. Acid. Carbolic 1 oz., Quin. Hydrochloride 60 grs., Mercuric Chloride ½ gr. For application to the nasal passage and pharynx in hay fever.

11. **Carbolised Smelling Salts**.—Carbolic acid 24, Ammon. Carb. 16, Liq. Ammon Fort. 44., Ol. Lavend 1½, Camphor 3, Pine Saw-Dust *q s* In coryza, influenza or hay fever.

12. **Phenol-Camphor.**—Carbolic acid 1, Camphor 3. As a local anæsthetic for toothache, and as a pigment in diphtheria alone or diluted with almond oil.

13. **Phenol Iodatum. Iodized Phenol.**—Iodine 1, Liquefied Carbolic Acid 4. Caustic and alterative. In endometritis, abrasions and granular condition of the cervix, ringworm on the scalp and body.

14. **Bromol. Tribromophenol.**—A white, crystalline, insoluble salt prepared by mixing a solution of carbolic acid with bromine water. A powerful antiseptic and caustic. Internally, an intestinal disinfectant in typhoid fever and diarrhœa. *Dose.*— ½ to 1½ grs.

15. **Bromo-phenol.** *Syn.—Ortho-monobromphenol.*—A violet colored liquid. A 2 p.c. ointment in erysipelas.

16. **Chlorphenol.** *Syn.—Para-monochlorphenol.*—A powerful antiseptic crystalline salt. Has given brilliant results in erysipelas by the application of an ointment (10 grs. to 1 oz.), and in tubercular ulcerations in the larynx and throat by a 5 to 20 p.c. solution in glycerin.

17. **Acid. Trichlorphenicum.** *Syn.—Trichlorphenol.*—Insoluble acicular crystals, forming soluble salts with alkaline bases. 25 times stronger than carbolic acid.

18. **Aseptol.** *Syn.—Sulphocarbolic acid. Sulpho-carbol. Sozolic acid. Phenol-sulphonic acid.*—A syrupy soluble liquid, resembling salicylic and carbolic acids in action. A 5 p.c. solution is used in abdominal surgery. A delicate test for albumen and bile in the urine.

19. **Sozal** is an *Aluminium salt of para-phenol-sulphonic acid.* Pale, reddish-brown, soluble, antiseptic. *Dose.*—3 to 8 grs.

SODII SULPHOCARBOLAS. Sodium Sulphocarbolate.

Sodium Phenol-para-sulphonate. $C_6H_4OH{\cdot}SO_2ONa, 2H_2O$.

Source.—Obtained by dissolving phenol in excess of sulphuric acid, and converting phenolsulphonic acid into a sodium salt.

Characters.—Colorless, transparent, rhombic prisms with a saline bitter taste. *Solubility.*—1 in 6 of water, 1 in 150 of alcohol 90 p.c.

Actions and uses.—Antiseptic and antipyretic. In dyspepsia, diphtheria, cholera, septic fevers, tympanites, &c. It is used in preference to carbolic acid. **B.P. Dose.**—3 to 15 grs.

ZINCI SULPHOCARBOLAS. Zinc Sulphocarbolate.

$Zn(OH{\cdot}C_6H_4SO_3)_2, H_2O$.

Source.—Obtained by heating a mixture of phenol and sulphuric acid and saturating the product with zinc oxide.

Characters.—Colorless, transparent, efflorescent crystals. *Solubility.*—1 in 2 of water, and 1 in 2·5 of alcohol 90. p.c.

Actions and uses. A strong antiseptic and astringent. In gonorrhœa and leucorrhœa as injection (2 to 3 grs. to 1 oz.). As a spray (5 grs to 1 oz.).

PHARMACOLOGY.

Externally.—Outside the body, carbolic acid arrests the life-processes of low organisms both vegetable and animal, and is a powerful **parasiticide**. It destroys also the properties of **organised ferments**, as yeast, moulds and bacteria, and prevents the zimosis of septic germs, as *anthrax bacilli.* Hence, it is an **antizymotic**, and **disinfectant**, though not so powerful as corrosive sublimate. It is said that a 5 p.c. solution kills the plague bacillus. Unorganised or chemical ferments (*enzymes*), such as pepsin, ptyalin are not so readily affected by it, except in very large doses. As it prevents decomposition, and generation of foul-smelling gases, it is an **antiseptic** and **deodorant**.

Applied to the skin, it causes a temporary burning followed by anæsthesia. If kept long, it acts as a caustic, with the formation of a **white eschar** without vesication. Hence, it is a local **irritant**, **anæsthetic** and **escharotic**.

Internally. **Gastro-intestinal canal**—In a concentrated form, carbolic acid has a similar action on the mucous membrane of the mouth, fauces, œsophagus and stomach, as on the skin. It is a powerful **gastro-intestinal irritant**. It is readily absorbed, and is probably converted into a sulphocarbolate in the stomach. It cannot influence the enzymes unless given in large doses.

Blood and circulation.—It is readily absorbed from the unbroken skin, wounded surface, mucous tracts, and subcutaneous tissues. How it remains in the plasma is not known, probably as an alkaline carbolate. In moderately large doses, it first stimulates then paralyses the **vasomotor centre**, thereby first increasing the blood-pressure and pulse-beat, and afterwards diminishing them. Cardiac action is not affected until very large doses are given, when it is depressed.

Respiration—No effect is seen in small doses, but large doses first stimulate then paralyse the **respiratory centre**.

Temperature.—No effect here too is found in medicinal doses, but large ones lower it.

Nervous system.—In pretty large doses, it affects the medulla and cerebrum. Its influence on the respiratory, cardiac and vasomotor centres having been already referred to. It also stimulates the **salivary** and **sweat-centres** producing **salivation** and **perspiration**. The anterior cornua is first stimulated then paralysed, causing first convulsions then paralysis. Poisonous doses, produce headache, giddiness, contracted pupils and finally coma.

Urine.—Carbolic acid and carbolates, are chiefly excreted by the urine, in the form of sulphocarbolates, glycuronic acid, pyrocatechin and hydroquinone. Pyrocatechin being a dark colored body, gives it a **dark or olive-green color**, but this cannot be the sole cause. Sometimes albumen is detected. *In poisoning* by the acid, *the normal sulphates disappear from the urine.* The urine is not decomposed.

Elimination.—By the saliva, sweat, respiratory and gastro-intestinal secretions and urine. A portion of it is lost in the body probably converted into oxalates and carbonates.

Acute toxic action.—If swallowed in a concentrated form, the patient feels intense burning pain in the mouth, fauces and stomach, with the formation of white eschars in the mouth, &c. He soon becomes collapsed with a cold clammy sweat, subnormal temperature, weak feeble pulse and shallow laborious breathing, heart and respiration stopping almost simultaneously. Reflex movements are lost and convulsions occasionally set in. Urine becomes dark-green, and finally the patient becomes insensible and comatose. The *post mortem* reveals hard, white eschars in the mouth, œsophagus and stomach, with or without inflammatory redness. Blood dark and its coagulability diminished.

Antidotes.—Pump, emetics. Soluble sulphates, such as magnesium sulphate 1 oz. or sodium sulphate ½ oz. in 8 ozs. of water at once. If no time can be spared, sodium sulphate should be injected hypodermically or into the peretoneum, in order to *counteract the poison in the blood, for the soluble sulphates combine readily with the acid.* Magnesium sulphate should not be injected. Besides, chalk, saccharated lime, egg-albumen, oils, demulcents, stimulants, hot water bottles, strychnine hypodermically, &c. Repeated washing of the stomach with glycerin has been found efficacious by Whitla.

Chronic toxic action.—The following symptoms have been observed by the writer in a case, where a deep suppurating cavity in the scrotal elephantiasis was plugged with carbolic acid dressings,—headache, anorexia, gastro-intestinal disturbance, insomnia, fever, dark urine.

Caution.—Green or smoky urine gives warning, but disappearance of ordinary sulphates from the urine is indicative of the approaching poisoning. The products of carbolic acid in the urine can be detected by distilling the urine, and adding bromine water to the distillate, when white crystalline sulphocarbolate precipitates.

THERAPEUTICS.

Externally.—Crude carbolic acid or phenyle is employed to disinfect, and remove the foul odors of, water-closets, drains, dissecting rooms, hospital-wards, bed-pans, spittoons, &c. A sheet moistened with a solution (1 in 40), and hung at the doorway of a sick-room disinfects the air, but it is doubtful whether it can act as a germicide. For small operations, as for instance, puncturing the skin with a hypodermic needle, carbolic acid may be applied to produce local anæsthesia. To stimulate **indolent sores**, to prevent the foul smells of **gangrenous ulcers**, to destroy **exuberant granulations**, **condylomas**, and the **poison of poisoned wounds**, the application of undiluted carbolic acid is most valuable. A 20 or 40 p. c. solution allays the **itching of urticaria** and **eczema.** Glycerin. Acid. Carbolic. is an effective remedy for **ringworm, favus,** and **tinea versicolor.** According to Whitla, a deep hypodermic injection (½ gr. to 20 ms. of water) has been found useful in **synovitis, glandular** and **joint swellings, erysipelas, poisoned wounds** and deep inflammations. Its solution is often injected after evacuating the contents of deep suppurating cavities, such as **empyema, iliac or psoas abscess.** To wash surgeons' hands, instruments, sponges, linen, and the parts to be operated upon, carbolised lotions are daily used in surgical practice. ½ gr. in water 5 ms. removes **piles** when injected. It is doubtful whether its inhalation is of any service in **phthisis, gangrene** of the lungs and **chronic bronchitis.** The pain of **anal fissures** and **ulcers** is relieved by the application of liquified carbolic acid. The application of Phenol Camphor or Iodized Phenol, removes **excoriated** and **ulcerated os** and **cervix,** and **chronic endometritis.** A vaginal douche (1 in 80 or 100) is beneficial in **leucorrhœa, uterine ulcer** and **cancer,** but it sometimes causes itching and irritation. Carbolic acid with a 5 to 10 p.c. of glycerin has been successfully injected in **hydrocele.**

Internally.—A pellet of cotton wool dipped in melted anhydrous carbolic acid, and put into the cavity of the **carious tooth,** and covered by an extra pellet to protect the soft parts, relieves **toothache.** For **ulcerative** and **aphthous stomatitis, follicular tonsillitis,** and **diphtheria,** a solution (glycerin. acid. carbolic. 15 to 20 ms. in water 1 oz.) makes an excellent gargle. **In hay asthma,** Pigmentum Antisepticum is a useful local application to the nares and pharynx. Sulphocarbolates are safer preparations for internal administration, than carbolic acid, and are found sometimes very serviceable in **chronic gastric affections,** destroying sarcinæ, and checking fermentation; whereby sickness, vomiting, diarrhœa and tympanites are controlled. Some use carbolic acid in **malarious** fevers, but the writer doubts its efficacy. Sulphocarbolates are largely employed in **septic fevers,** such as puerperal fever, erysipelas, diphtheria, &c. As an intestinal antiseptic, carbolic acid has been employed in **enteric fever, sloughing dysentery, acute and chronic diarrhœa** with doubtful results.

Prescribing hints.—Best given in pills. They must be coated with keratin or varnished with salol, if intended for action on the intestine. When given in a mixture, it should be well diluted, and combined with glycerin and peppermint water.

ACIDUM CHROMICUM. Chromic Anhydride. CrO_3.

Source.—Produced by the interaction of sulphuric acid, and potassium bichromate.

Characters.—Crimson, acicular, deliquescent, crystals. *Solubility.*—Freely in water. Decomposed by alcohol.

Action.—Powerfully corrosive, disinfectant and antiseptic.

OFFICIAL PREPARATION.

1. **Liquor Acidi Chromici**.—1 in 4. Caustic.

PHARMACOLOGY.

Externally.—It is a powerful **oxidising agent**, destroying low organisms, and is therefore a **deodorant** and **disinfectant**. It coagulates albumen and oxidises organic substances, and therefore acts as a **caustic**.

THERAPEUTICS.

Externally.—Liquor Acidi Chromici is used in destroying **warts, condylomas, lupus, cystic goitre,** and other small **cystic tumors.** It should be applied with a pointed glass rod, the adjacent parts being protected by a plaster or ointment, and a piece of wet lint kept ready to absorb any superfluous acid. A lotion (10 grs. to 1 oz.) has a decided good effect on **syphilides, psoriasis** and **nodules** on the tongue. **Ranula** and **lingual epithelioma** require the application of a more concentrated solution (1 to 2), which should be washed off after a few minutes with aluminium acetate solution. A weak lotion (1 in 40 or more) is useful in **ulcerated gums** and **foul sores** ; and as an injection (1 in 2000 to 4000) in **gonorrhœa** and **leucorrhœa**. A 3 per cent solution checks perspiration of the feet.

Chromic acid solution does not burn or stain linen, and is a delicate test for albumen in the urine.

Prescribing hints.—It should not be mixed with glycerin or alcohol as the mixture would explode (see p. 111).

ACIDUM CITRICUM. Citric Acid.

Hydrogen Citrate. $C_3H_4{\cdot}OH{\cdot}(COOH)_3,H_2O$.

Source.—Prepared from the juice of the fruit of various species of *Citrus*.

Characters.—Colorless, trimetric prisms ; taste acid. *Solubility.*—4 in 3 of cold and 2 in 1 of boiling water. *Impurities.*—Copper, lead, iron, calcium, sulphuric and tartaric acids

Incompatibles.—Alkaline carbonates, potassium tartrate, and acetates.

Enters into.—Succus Limonis (17½ grs. in ½ oz.), Syr., Limonis, Sod. Phosph. Effer., Sod. Sulph Effer., Mag. Sulph. Effer., Lith. Citras Effer , Liq. Ammon. Citratis. All these contain free citric acid.

20 grs. of Citric Acid in 1 oz. of water	will neutralise	30 grs. of Pot. Bicarb. 24 grs. of Sod. Bicarb. 17 grs. of Ammon. Carb. 13 grs. of Mag. Carb.

Action.—Refrigerant, antiscorbutic. **B.P. Dose**.—5 to 20 grs. in water.

ACIDUM TARTARICUM. Tartaric Acid. $C_4H_6O_6$.

Source.—Prepared from potassium tartrate.

Characters.—Colorless, monoclinic prisms ; taste acid. *Solubility.*—10 in 8 of water, 1 in 2½ of alcohol 90 p.c. *Impurities.*—Iron, lead, copper, calcium, tartrate of potassium, oxalic acid, arsenium, &c.

Incompatibles.—Salts of calcium, potassium, lead, mercury, alkaline carbonates and vegetable astringents

Enters into.—Mag. Sulph. Effer., Sod. Sulph. Effer., Sod. Phosph. Effer., Pulv. Sod. Tart. Effer., Lith. Citras Effer. and Pil. Quin. Sulph.

Dispensing hints.—Both citric and tartaric acids should be weighed on the dry glass pan, and preserved in a tightly fitted bottle, otherwise they would melt from dampness.

20 grs. of Tartaric Acid in 1 oz. water	will neutralise	27 grs. of Potas Bicarb. 22 grs. of Sodium Bicarb. 15½ grs. of Ammon. Carb.

SUCCUS LIMONIS. Lemon Juice. N.O. *Rutaceæ.*

Syn. I.V.—*Nembu-ras*, Beng. *Nembuka arak*, Hind.

Habitat.—West Indies, Southern Europe, India.

Source.—Freshly expressed juice of the ripe fruit of *Citrus Medica*, var. *β. Limonum.*

Characters.—Slightly turbid yellowish, sp. gr. 1.030 to 1.040. 1 fl. oz. contains 30 to 40 grs. or on an average 35 grs. of citric acid.

Composition.—Citric acid free and combined, malic acid, phosphoric acid, &c.

110 ms. of the juice are neutralised by 11½ grs. of $KHCO_3$, 9½ grs. of $NaHCO_3$, and 16½ grs. of Na_2CO_3.

Action.—Refrigerant, antiscorbutic, *Dose.*—1 to 2 ozs.

Enters into.—The preparation of Citric Acid and the

Official Preparation.

1. **Syrupus Limonis**.—1 in 2. **B.P. Dose**.—½ to 1 dr.

Pharmacology of Citric Acid, Tartaric Acid and Lemon Juice.

Externally.—They have no action on unbroken skin, but cause irritation and pain when applied to abraded surface.

Internally. **Mouth**.—Being acid, they stimulate the salivary secretion and thereby allay thirst.

Stomach.—Free acids unite with the bases and form neutral salts. When given in an effervescing form, the liberated **Carbonic acid gas** acts as a **gastric sedative**.

Blood.—The neutral salts formed in the stomach are **deoxidised** in the blood after absorption. For instance, potassium citrate becomes decomposed into potassium carbonate, carbonic acid and water, thus $2(C_3H_4.OH(COOK)_3)+O_{18}$ (from blood)

$=3(K_2CO_3)+9CO_2+5H_2O$, thereby **increasing** the **alkalinity** of the plasma. If these acids are given in large doses, a portion remains unoxidised and thus *diminishes* the alkalinity.

Urine.—These acids are excreted as carbonates, except in large doses, when they escape partly unchanged. Hence, in medicinal doses, they increase the **alkalinity of the urine.**

THERAPEUTICS OF CITRIC ACID, TARTARIC ACID AND LEMON JUICE.

Internally.—As a refrigerant drink *e. g.* lemonade, they are given to allay thirst in **fevers**. The sucking of a lemon is soothing in dryness of the mouth. Carbonic acid—the product of an effervescing mixture checks **nausea** and **vomiting.** Citrates, tartrates and acetates are all useful in **uric acid** and **oxalate of lime** deposits. Lemon juice and citric acid are specifics for **scurvy**. Some assert that lime juice ($\frac{1}{2}$ to 1 pint) is serviceable in **acute rheumatism**. Some think it useful in malarious fevers. In our days, citric and tartaric acids are chiefly used for their remote local effects, and for making effervescing draughts and preparations.

ACIDUM GALLICUM. See GALLA.

ACIDUM HYDROBROMICUM DILUTUM.

Diluted Hydrobromic Acid. HBr.

Source—An aqueous solution containing 10 p.c. by weight of hydrogen bromide, obtained by the distillation of potassium bromide with concentrated phosphoric acid.

Characters.—A colorless, inodorous liquid ; taste and reaction acid ; sp. gr. 1·077. *Impurities*—Arsenic, barium, chlorides, phosphates, sulphates or sulphites.

Dispensing hints.—Should be kept in the dark. Commercial acid gets coloured by keeping.

Action.—Sedative, hypnotic. **B.P. Dose.**—15 to 60 ms. (60 ms. = 10 grs. of potassium bromide.)

NON-OFFICIAL PREPARATION.

1. **Acidum Hydrobromicum Concentratum.**—1 in 3 of distilled water makes the official diluted acid.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Diluted Hydrobromic acid has the same action as that of the bromides, but is not so reliable. It is chiefly used in combination with quinine to prevent cinchonism, and sometimes, with morphine to prevent its after-effects. It neither gives rise to **acne**, nor is so depressant as bromides. The writer often combines it with quinine, when he administers large doses.

Prescribing hints.—Large doses (2 to 4 drs) may be given freely diluted or with syrup and water.

Acidum Hydrochloricum, Acidum Nitricum, Acidum Phosphoricum and **Acidum Sulphuricum** are described together as their actions are similar.

ACIDUM HYDROCHLORICUM. Hydrochloric Acid. HCL.

Syn.—Muriatic acid. Spirits of Salts.

Source.—Obtained by dissolving in water the gas produced by the interaction of sulphuric acid and sodium chloride, containing 31·79 p.c. of hydrogen chloride by weight.

Characters.—A *colorless*, strongly acid liquid, emitting white fumes; sp. gr. 1·160 *Impurities.*—Sulphurous and sulphuric acids, arsenic, copper, lead, iron, aluminium, bromides, iodides, free chlorine.

Incompatibles.—Lead, silver and mercurous salts, tartar emetic, alkalis and their carbonates.

Action.—Powerfully escharotic.

Enters into.—The preparation of Acid. Nitro-hydrochloric. Dil., Apomorph. Hydrochlor., Cocaine. Hydrochlor., Glyc. Pepsin., Liq. Arsen. Hydrochlor., Liq. Ferri Perchlor. Fort., Liq. Zinc. Chlor., Podophyl. Resin., many chlorides, and the

Official Preparation.

1. **Acidum Hydrochloricum Dilutum.**—Contains 10·58 p.c. of hydrogen chloride. **B.P. Dose.**—5 to 20 ms. diluted.

Enters into.—The preparation of Ext. Ergot., Inj. Apomorph. Hyp., and Liq. Morph. Hydrochlor.

Pharmacology and Therapeutics.

Internally.—Being the normal acid of the gastric juice, it is given in **dyspepsia** after meals when the flow of the gastric juice is deficient, and before food when it is excessive. It is also employed to **reduce the alkalinity** of urine in **phosphatic deposits,** and to **stimulate the hepatic action.**

ACIDUM NITRICUM. Nitric Acid. HNO_3.

Source.—Prepared by the interaction of sulphuric acid and potassium and sodium nitrate; containing 70 p.c. of hydrogen nitrate.

Characters.—A *clear*, *colorless*, acid liquid emitting corrosive fumes; sp. gr. 1.42. *Impurities.*—Lead, copper, iron, arsenic, chlorides, bromates, iodates, sulphates.

Incompatibles.—Alkalis, alcohol, carbonates, oxides, sulphates, lead acetate, ferrous sulphate.

Action.—Powerfully corrosive.

Enters into.—The preparation of Acid. Phosph. Con., Argent. Nitras, Liq. Ferri Perchlor. Fort., Liq. Ferri Pernit. Fort., Liq. Ferri Persulph., Liq. Hydrarg. Nit. Acid., Spt. Æther. Nitros., Ung. Hydrarg. Nit., and the

OFFICIAL PREPARATIONS.

1. **Acidum Nitricum Dilutum.**—1 in 5⅙ or 17·44 p.c. of hydrogen nitrate **B.P. Dose.**—5 to 20 ms. (5 ms. contain 1 m. of HNO_3).

2. **Acidum Nitro-Hydrochloricum Dilutum.**—¾ and 1 in 8. (16 ms. contain 1½ ms. of nitric and 2 ms. of hydrochloric acid). *Composition.*—Free chlorine, hydrochloric, nitric and nitrous acids. It should be set aside for 14 days before use. **B.P. Dose.**—5 to 20 ms. diluted.

PHARMACOLOGY AND THERAPEUTICS

Externally.—Strong nitric acid is often employed to destroy **chancre, warts, hæmorrhoids, phagedænic sores** and the poison of venomous snakes and rabid dogs. Nitro-hydrochloric acid bath (see p. 64) is useful in **chronic hepatic congestion.**

Internally.—Both the diluted nitric acid and nitro-hydrochloric acids are **sialagogues, gastric tonics** and **hepatic stimulants,** and are largely employed in **dyspepsia, torpidity of the liver** and **catarrhal jaundice.** They are sometimes given in **infantile diarrhœa** on account of their **feeble astringent** property, and in **chronic bronchitis** when the secretion is profuse. Where mercury is not borne, nitric acid is sometimes given in **syphilis.** It benefits **mercurial** and other forms of **stomatitis.** It can dissolve **phosphatic calculi** if injected into the bladder or given internally.

ACIDUM PHOSPHORICUM CONCENTRATUM.

Concentrated Phosphoric Acid. H_3PO_4.

Source.—Prepared by treating, with water and nitric acid, the risidue left after burning phosphorus in air; containing 66·3 p.c. of hydrogen orthophosphate.

Characters.—A colorless, *syrupy* liquid; taste and reaction acid; sp. gr. 1·5. *Impurities.*—Lead, copper, arsenic, sulphuric, nitric, hydrochloric, phosphorus, pyro and metaphosphoric acids, silica.

Incompatibles.—Sodium carbonate, calcium salts.

Action.—Caustic.

Enters into.—The preparation of Acid Hydrobrom. Dil., Ammon. Phosph., Syr. Calcis Lactophosph., Syr. Ferri Phosph., Syr. Ferri Phosph. c. Quin. et Strych. and the

OFFICIAL PREPARATION.

1. **Acidum Phosphoricum Dilutum.**—3 in 20, or 13·8 p.c. **B.P. Dose.**—5 to 20 ms.

PHARMACOLOGY AND THERAPEAUTICS.

Internally.—The diluted acid is a **refrigerant and gastric tonic.** It does not derange the digestion. It makes an agreeable drink for **diabetes** and **febrile diseases.** By some it is considered serviceable in **phosphatic diathesis.** It is a mistake to ascribe the therapeutic virtues of free phosphorus to the acid.

ACIDUM SULPHURICUM. Sulphuric Acid. H_2SO_4.

Source.—Obtained by the combustion of sulphur or pyrites and the oxidation and hydration of the resulting sulphurous anhydride by means of nitrous and aqueous vapors.

Characters.—A *colorless*, corrosive, *oily*, acid liquid, evolving heat when water added. Sp. gr. 1·843. *Impurities.*—Lead, copper, iron, arsenic, selenium, ammonium, carbonaceous matters and other acids.

Incompatibles.—Alkalis and their carbonates, calcium and lead salts.

Action.—Powerfully corrosive.

Enters into.—The preparation of many mineral acids, ethers, sulphates, Inf. Rosæ Acidum, and the

OFFICIAL PREPARATIONS.

1. **Acidum Sulphuricum Aromaticum. Elixir of Vitriol.** (see Addendum).—1 in 14 or 13·8 p.c. of hydrogen sulphate. **B.P. Dose.**—5 to 20 ms.

Enters into.—Inf. Cinchon. Acidum.

2. **Acidum Sulphuricum Dilutum.**—1 in 12 nearly. While being diluted, the acid should be added to the water. **B.P. Dose.**—5 to 20 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The concentrated sulphuric acid has a strong affinity for water, charring and desiccating the parts with which it comes in contact. It is therefore a most powerful **caustic.** The diluted acid is a local **astringent** and **styptic.** A weak solution when sponged over the body acts as an **anhydrotic.**

Internally.—It is an irritant, caustic poison in a concentrated form. Freely diluted, it may be given to **allay thirst** in **cholera** and **hæmorrhage.** Being a powerful **gastro-intestinal astringent,** it is successfully employed in **diarrhœa, cholera** and **gastro-intestinal hæmorrhage.** It is thrown off by the kidneys and bowels as sulphates It prevents the absorption of lead, and Whitla says by taking lemonade prepared with sulphuric acid, workers in lead have been able to escape lead poisoning. It checks night-sweat of **phthisis** if given with zinc sulphate.

GENERAL PHARMACOLOGY OF HYDROCHLORIC, NITRIC, PHOSPHORIC AND SULPHURIC ACIDS.

Externally.—All are **irritants** and **corrosives** in a concentrated form. Diluted solutions are local **astringents** and **styptics.** Still more diluted, they are **external refrigerants** and **anhydrotics.** All mineral acids are **disinfectants.**

Internally. **Gastro-intestinal tract.**—They stimulate the secretion of the alkaline **saliva** and thus **allay thirst.** In the stomach they neutralise free alkali and form neutral salts, which are probably absorbed as such. Given before food, they retard the flow of the acid secretion—gastric juice ; and with or after food, they promote that of the alkaline secretions as of the liver, pancreas and intestinal glands. Nitric and nitro-hydrochloric acids act also as powerful **hepatic stimulants** and **cholagogues.** Diluted acids especially sulphuric have an **astringent** action on the intestine.

Blood.—They circulate in the blood as neutral salts, and render the *blood less alkaline but never acid.* Hydrochloric acid increases the number of red blood corpuscles in **chlorosis**, but does not affect the hæmoglobin. Phosphorus is believed to increase the amount of phosphates in the red blood corpuscles, and thus to act as **hæmatinics.**

Kidneys.—They do not increase the **free acidity of urine** to any appreciable extent, but the action of the kidneys may be stimulated by the excretion of extra solids. Nitric acid is partly converted into ammonia and tends to increase the alkalinity of urine.

Acute toxic action.—All these acids are **irritant poisons.** If swallowed in a concentrated form, intense burning pain extending from the mouth to the stomach, excoriation and formation of grey or yellowish eschars in the mouth, severe abdominal pain and tenderness, vomiting of coffee colored matters containing dark clots of blood and shreds of mucus, constipation, or if bowels are open, stools dark from the admixture of blood, are the prominent symptoms. Dyspnœa due to laryngeal swelling either from irritant fumes or from the introduction of some of the acid is not infrequent. Collapse with cold perspiration soon set in and the patient dies.

Antidotes.—No pump. Alakalis, such as soda, lime water, soap water, magnesia in a moderately diluted solution at once. Demulcents as egg-albumen, bland oils, linseed tea, &c. Morphine subcutaneously to relieve pain, ether, brandy, &c. as stimulants.

Chronic toxic action.—General emaciation, languor, catarrhal inflammation of the gastro-intestinal canal, anorexia and anæmia are the chief symptoms.

ACIDUM HYDROCYANICUM DILUTUM.

Diluted Hydrocyanic Acid. HCN.

Syn.—Diluted Hydrogen Cyanide. Prussic Acid.

Source.—An aqueous solution containing 2 p.c. of hydrogen cyanide by weight, prepared by the interaction of diluted sulphuric acid and potassium ferrocyanide ; thus, $2K_4Fe(CN)_6 + 3H_2SO_4 = 6HCN + Fe_2K_2(CN)_6 + 3K_2SO_4$.

Characters.—A colorless, volatile liquid with a peculiar odor ; sp. gr. 0·997. *Impurities.*—Sulphates and chlorides

Identification.—Its peculiar almond-like odor helps recognition. Its vapor in large quantities is poisonous.

Incompatibles.—Copper, iron and silver salts, red mercuric oxide and sulphides.

Dispensing hints.—It should be stocked in blue, small, stopp red bottles which are tied over and inverted, in a cool, dark place. If its color becomes brown it is unfit for use. Extemporaneously it can be prepared, if necessary, by mixing silver cyanide 6, diluted hydrochloric acid B.P. 15, distilled water 45, by shaking and filtering. Product = 2 p.c. of HCN.

Action—A most rapid, deadly poison. Sedative, antispasmodic. **B.P. Dose.**—2 to 6 ms. *Daily Dose.*—10 ms.

Enters into.—Tr. Chloroform. et Morph. Co. Aq. Laurocerasi, Amygdala Amara and Prunum Virg. also contain it.

NON-OFFICIAL PREPARATIONS.

1. **Acidum Hydrocyanicum** (Scheele) **B.P.C.**—Contains 4 p.c. of HCN. *Dose.*—1 to 4 ms.
2. **Vapor Acidi Hydrocyanici, B.P. 1885.**—10 to 15 ms. in water 1 dr.

PHARMACOLOGY.

Externally.—It is a protoplasmic poison. It is absorbed from the epidermis, but more readily from a raw surface. It paralyses the perephery of the sensory nerves, and thus acts as a **local sedative** and **anæsthetic.**

Internally. **Alimentary canal.**—It is also absorbed rapidly by the mucous membrane, and has the same action on the mouth and stomach as on the skin. It is therefore a powerful **gastric sedative.**

Blood.—It quickly enters the blood from all parts of the body. If death is immediate, the **venous blood** is found **bright and scarlet,** due possibly either to the arrest of the oxygenation of hæmoglobin, or according to Brunton, to the rapid flow of blood through the dilated perepheral blood-vessels without undergoing the usual changes. But, if death is delayed even for a few minutes, the blood becomes **deep dark,** owing to the conversion of oxygen into carbonic acid, most probably from asphyxia due to the paralysis of the respiratory centre.

Heart and blood vessels.—A large dose at once arrests the heart in its diastole, by paralysing the **cardiac centre,** and the nervo-muscular apparatus of the heart, for it has been observed that hydrocyanic acid stops also the heart's action when topically applied. A small dose stimulates the **vagal centre, and slows the pulse.** The **blood pressure** is first momently **heightened** and afterwards **deeply lowered** from a transitory stimulation and subsequent paralysis of the **vasomotor centre.**

Respiration.—As a rule, the **respiratory centre is first paralysed** after a brief stimulation. Respiration becomes feeble and dyspnœac, and death takes place from asphyxia, unless the heart is instantly stopped by a large dose.

Brain.—Medicinal doses have no action. Large doses cause **insensibility** and **coma,** referable either to the direct action of the drug on the cerebrum, or to the altered condition of blood from asphyxia. **Pupils** are **dilated.** Convulsions do not occur in man.

Medulla and cord.—It is a **paralyser** of the respiratory, cardiac, and vaso-motor centres. The cord is first lowered in its activity and is afterwards paralysed. The perepheral sensory nerves are less affected by internal administration, than by local application. The motor nerves and muscles are also paralysed.

Elimination.—Hydrocyanic acid dilute is rapidly excreted, probably by breath. A portion of it is supposed to be thrown out as a formate of ammonia.

Acute toxic action.—If the dose is large, death is instantaneous. But, if it is not so, the patient becomes unconscious ; his eyes fixed ; pupils dilated; pulse feeble, irregular and imperceptible ; respiration slow, deep and convulsive with frothing at the mouth ; skin cold and calmmy and at last death occurs. At the *post mortem* are found the odor of hydrocyanic acid, lividity of the surface, clenched fingers, firmly closed jaws, froth at the mouth, fixed and glistening eyes, dilated pupils, dark blood, and slightly congested stomach.

Antidotes.—Emetics or pump if possible. Fresh air, cold and hot affusion alternately to the head, artificial respirations, diffusible stimulants, oxygen and ammonia inhalation and electricity. Atropine and strychnine hypodermically. Protosalts of iron are chemical antidotes.

THERAPEUTICS.

Externally.—Hydrocyanic acid dilute removes the itching of **urticaria, lichen** and **dry eczema,** when the diseased parts are bathed or sponged with a lotion (2 drs to 8 ozs. of rose water and glycerin). For the same purpose, an ointment (½ dr. to 1 oz.) may be used. Care should always be taken that the skin is not raw.

Internally.—It is ordinarily prescribed for **irritative gastric disorders** and **dyspepsia** with sodium bicarbonate, bismuth and gentian. It allays the **hacking cough** of phthisis, and the spasms of **asthma, purtussis** and **hiccough.** It checks palpitation and cardiac distress caused by dyspepsia.

Prescribing hints.—Hydrocyanic acid dilute may be combined with sodium bicarbonate (see p. 109) and be given in an effervescing draught or in an almond emulsion.

ACIDUM LACTICUM. Lactic Acid.

Hydrogen Lactate. $CH_3{\cdot}CHOH{\cdot}COOH$.

Source.—May be prepared from the fermentation of lactose, containing 75 p.c. of hydrogen lactate.

Characters.—A colorless, syrupy liquid ; sp. gr. 1·21, *solubility.*—Freely in water, alcohol and ether. *Impurities.*—Mineral and other acids, sugar, lead, &c,

Action.—A solvent of diptheritic false membranes.

OFFICIAL PREPARATION.

1. **Syrupus Calcii Lactophosphatis. B.P. Dose**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Acidum Lacticum Dilutum.** B.P. 1885 —Lactic acid 3 ozs., distilled water to 1 pint. *Dose.*—½ to 1 dr.
2. **Nebula Acidi Lactici, T.H.**—Lactic acid 1, Distilled Water
3. **Calcii Lactas.** *Dose.*—1 to 5 grs.
4. **Ferri Lactas.** *Dose.*—2 to 10 grs.
5. **Syrupus Calcii et Ferri Lactophosphatum.** *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The concentrated acid is **corrosive** and is used alone or in the form of a paste with kaolin to destroy **lupus.**

Internally.—A 50 p. c solution has been successfully applied to **pharyngeal tubercles** after scraping. As a pigment or spray it is occasionally used to dissolve **false diphtheritic membranes.** On the stomach, it acts like hydrochloric acid, and is often given as a **gastric adjuvant** in **dyspepsia.** It allays thirst in **diabetes** and other diseases. Sour butter-milk may be used as its substitute for the same purpose. It is said to be useful in **diarrhœa of phthisis** and of **enteric fever**, and in the **green diarrhœa of infants.** It enters the blood as a lactate, and is passed out in the urine as a carbonate or carbonic acid in solution.

ACIDUM NITRICUM. See page 188.

ACIDUM OLEICUM. Oleic Acid.

Hydrogen Oleate. $CH_3(CH_2)_7CH : CH(CH_2)_7COOH$.

Source.—Obtained by the saponifying action of alkalis and subsequent action of acids, or by the action of superheated steam, upon the olein of fats.

Characters.—A straw coloured liquid, odor faintly rancid. *Solubility.*—In alcohol 90 p.c., chloroform or ether. *Impurities.*—Rarely pure. Palmitic and stearic acids.

Enters into.—The preparation of Oleates of Lead, Mercury and Zinc, and of Ointments of Aconitine, Atropine, Cocaine, Mercuric Oleate and Veratrine.

ACTIONS AND USES.

Oleic acid enters the skin more readily than fixed oils and fats, and is therefore used in pharmacy for compounding ointments containing metallic oxides and alkaloids.

ACID. PHOSPH. CONCEN. See page 189.

Acidum Salicylicum, Salicinum and **Salol** are described together, because of the similarity of their actions.

ACIDUM SALICYLICUM. Salicylic Acid. $C_6H_4 \cdot OH \cdot COOH$.

Source.—It is of two kinds.—(1) **Natural Salicylic Acid,** prepared from natural salicylates, such as the oil of winter green (*Gaultheria procumbens.* N.O. *Ericaceæ),* or the oil of sweet birch (*Betula lenta.* N O. *Butalaceæ).* (2) **Artificial Salicylic Acid,** prepared by the interaction of sodium carbolates and carbonic anhydride. *Physiologically pure* artificial salicylic acid can be had in the market.

Characters.—Prismatic, colorless crystals; taste sweetish then acid, leaving a burning sensation in the throat. *Solubility.*—1 in 500 of cold water and 1 in 15 of hot water, 1 in 3 of alcohol 90 p.c., 1 in 2 of ether, 1 in 200 of glycerin; also soluble in solutions of ammonium acetate, ammonium citrate, borax, sodium phosphate, alkaline hydroxides and carbonates. *Impurities.*—Meta- ortho- and para-cresotic acids, phenol, coloring matter, &c.

Identification.—Salicylic acid resembles quinine sulphate, and benzoic acid. ·Observe the size, and the rough feel of the crystals. The crystals of quinine are finer, softer, and not irritating to the nose. The crystals of benzoic acid are less gritty to the feel and have an aromatic odour. Acid Salicylic has no resemblance to strychnine.

Incompatibles.—Iron salts and nitric ether.

Action.—Antiseptic, antirheumatic. **B.P. Dose.**—5 to 20 grs.

Enters into.—Inj. Cocain. Hypo., Liq. Atrop. Sulph., Salol, and the

OFFICIAL PREPARATION.

1. **Unguentum Acidi Salicylici.**—1 in 50. A local antiseptic.

SODII SALICYLAS. Sodium Salicylate.
$(C_6H_4 \cdot OH\ COONa)_2,H_2O$.

Source.—Obtained by the interaction of salicylic acid and sodium carbonate or sodium hydroxide. As there are two acids natural and artificial, so there are two sodium salts "*natural*" and "*artificial.*"

Characters.—Small, colorless or white scales or tabular crystals with a pearly lustre; taste sweetish, unpleasant. *Solubility.*—1 in 1 of water, 1 in 6 of alcohol 90 p.c. *Impurities.*—Carbolates and sulphocarbolates.

Incompatibles.—Acids, antipyrine, quinine and iron salts.

Action.—The same as salicylic acid. **B.P. Dose.**—10 to 30 grs. *Maximum Single Dose.*—40 grs. *Daily Dose.*—120 grs.

Enters into.—The preparation of Bismuth salicylas.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES OF SALICYLIC ACID.

1. **Effervescent Sodium Salicylate.**—6 grs. in 1 dr. *Dose*—1 dr. 2. **Ammonii Salicylas**; *Dose.*—5 to 30 grs. 3. **Calcii Salicylas** in diarrhœa; *Dose.*—2 to 20 grs. 4. **Potassii Salicylas**; *Dose.*—5 to 30 grs. 5. **Quininæ Salicylas** (see quinine). 6. **Strontii Salicylas,** in lithæmia and chronic gout; *Dose.*—5 to 20 grs. 7. **Ferri Salicylas,** antiseptic, astringent; *Dose.*—3 to 10 grs.

8. **Collodium Salicylicum.**—Salicylic Acid 30, Ext. of Indian Hemp 5, Flexile Collodion 240, A painless solvent for hard and soft corns.

9. **Glycer. Acidi Salicylici.** *Syn.—Salicylic Cream.*—Salicylic Acid 1, Glycerin 1.

10. **Pulv. Salicylas c. Talco.**—Salicylic Acid 3, Wheat Starch 10, Talc 87. The U.S.N.F. substitutes Boric Acid for wheat flour.

4. **Salicylic Dressings.—Gauze, Lint, Wool** 4 p.c.

11. **Salicylic and Creosote Plaster Mulls** (Unna).—½ to 1 gr. in 1 square inch, applied to horny epidermis,

12. **Salumin.** *Syn.—Salicylate of Aluminium.*—In reddish powder insoluble in water. Astringent and antiseptic. In ozæna and pharyngeal affections.

13. **Salacetol.** *Syn.—Salyl Acetol.*—A compound of Salicylic Acid and Acetol. As an intestinal antiseptic in diarrhœa in from 30 to 45 grs. in 1 oz. of castor oil before breakfast.

14. **Salicylamide.**—Tasteless, colorless, soluble (1 in 250 of water) crystals, prepared by the action of strong ammonia on methyl salicylate obtainable from the oil of winter green. A safe and powerful analgesic. *Dose.*—3 to 5 grs.

15. **Agathin.** *Syn.—Salicyl-a-methyl-phenyl-hydrazone.* White or greenish-white crystals insoluble in water. Analgesic and antirheumatic. *Dose.*—4 to 8 grs. thrice daily, to be reduced after 3 or 4 days.

16. **Dithion.** *Syn.—Sodii-Di-thio-Salicylas.*—A greyish or yellowish-white, powder soluble in water. A more powerful antirheumatic thrice daily but free from objectionable sequelæ. *Dose.*—3 grs.

17. **Saliformin.** *Syn.—Hexa-methylene-tetramine-salicylate.*—In white, soluble crystals. A genito-urinary antiseptic and solvent of uric acid. In gout, cystitis, gravel. *Dose.*—15 to 30 grs. daily freely diluted.

18. **Salophen.** *Syn.—Acetyl-para-amido-phenyl-salicylic-ester.*—Whitish, tasteless crystals, insoluble in water. It is unaffected by gastric juice, but decomposed by the pancreatic secretion. Has a quicker action on acute rheumatism than salicylic acid. *Dose.*—10 to 30 grs. in cachets.

19. **Acidum Aceto-Salicylicum** is a valuable substitute for salicylic acid without its unpleasant secondary properties. *Dose.*—10 to 15 grs.

SALICINUM. Salicin. N.O. *Salicaceæ.*

$C_6H_{11}O_5 \cdot O \cdot C_6H_4 \cdot CH_2OH$.

Habitat.—Temperate regions of the Northern Hemisphere.

Source.—A crystalline glucoside obtained from the bark of various species of *Salix* and of *Populus.*

Characters and Tests.—Colorless, shining, trimetric tabular crystals; taste bitter. *Solubility,*—1 in 28 of cold water, 1 in 60 of alcohol 90. p.c. *Tests.*—colored red by H_2SO_4. Heated with potassium bichromate, a few drops of H_2SO_4 and water, yields salicylic aldehyde having the odor of meadow-sweet.

Action.—The same as sodii salicylas. **B.P. Dose.**—5 to 20 grs. *Daily Dose.*—150 grs. in cachets, pills or mixture.

NON-OFFICIAL DERIVATIVE AND ALLIED PREPARATION.

1. **Saligenin.** *Syn.—Salicylic Alcohol.*—In colorless leaflets soluble in water, obtained either by acting on phenol with formic aldehyde or on salicin with diluted mineral acids. In acute rheumatism and gout. *Dose.*—5 to 10 grs.

2. **Salix Nigra** or *Black Willow.*—A sexual and uterine sedative, considered useful in hyperæsthesia and pain of ovaries, seminal emissions, and nymphomania. The liquid extract of bark, root and buds (1 in 1) is given in ½ to 1 dr. thrice daily.

SALOL. Salol.

Phenyl Salicylate. $C_6H_4{\cdot}OH{\cdot}COO{\cdot}C_6H_5$.

Source.—By the interaction of salicylic acid and phenol, or of their sodium salts with phosphoryl chloride or carbonyl chloride.

Characters.—Colorless crystals with a faint aromatic odor and little taste. *Solubility.*—insoluble in water, 1 in 20 of alcohol 90 p.c., and in fixed and volatile oils. *Impurities.*—Free salicylic acid, sulphates and chlorides

Action.—Intestinal antiseptic and analgesic. **B.P. Dose.**—5 to 15 grs. in milk or cachets.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Collodium Salol.**—Salol 4, Ether 4, Collodion 30. An effective painting in acute rheumatism.

2. **Salol cum Camphora.**—Salol 3, Camphor 2. Triturate. A strong antiseptic liquid to check the suppuration of the middle ear, and in the treatment of carbuncles,

3 **Ung. Salol c. Cocaina.**—Salol 2, Cocaine hyd. 1, Petroleum Cerate 16. Mix. In burns.

4. **Salol Tribromide.** *Syn.—Cordol.*—A colorless, tasteless powder. A remote astringent and safe hypnotic. *Dose.*—20 to 30 grs.

PHARMACOLOGY OF SALICYLIC ACID, SALICIN AND SALOL.

Externally.—Salicylic acid, salicin and salol are **antiseptics**, but the acid is the most powerful. A 2 per cent solution of the acid kills bacteria and checks fermentation, but its salts have no antiseptic properties. Salol acts like iodoform. Salicylic acid is a powerful **local anhidrotic.** Applied to the nose it causes sneezing and cough. It softens and removes the epithelium.

Internally. **Alimentary canal.**—Salicylic acid is an **irritant** to the stomach, when taken undiluted, causing pain, nausea and vomiting. Sodium salicylate, salicin and salol are less irritant. Salicin is a **bitter, stomachic, tonic.** Salicin and Salol are transmitted unchanged into the intestine, where they are broken up probably by the help of the pancreatic juice. Salicin is partly converted into **saligenin** and **glucose**, and saligenin again into salicyluric, salicylous and salicylic acids Salol is in like manner broken up into carbolic and salicylic acids, the latter again into salicyluric acid.

Blood.—Salicylic acid enters the blood as a sodium salicylate, which at any rate, is the form in which it is found in the blood. Some think it exists as an albuminate, but there is no proof. There is also no evidence to shew that sodium salicylate is converted again into salicylic acid by carbonic acid. However, it is a fact, that a portion of the salicylic acid of the salicylate unites with glycocoll either in the blood or tissues to form salicyluric acid ; thus $HC_7H_5O_3$ (salicylic acid)$+C_2H_5NO_2$ (glycocoll)$=HC_9H_8NO_4$ (salicyluric acid) $+H_2O$. This chemical change is identical with what happens at the conversion of benzoic acid into hippuric acid.

Heart and blood-vessels.—Salicylic acid, salicin and salol are said to **depress the heart** and **lower the blood-pressure**, but salicin and salol do not act so, unless given in toxic doses. Again, the natural salicylic acid is not so depressant as the artificial one, because the latter contains certain impurities, such as **ortho-cresotic acid** which is a strong **cardiac sedative.** Physiologically pure artificial acid is not a depressant.

Respiration.—Medicinal doses have no action on respiration. Large or toxic doses greatly **depress** it, and may cause death from asphyxia.

Temperature.—They do not affect the normal temperature in moderate doses, but powerfully lower the febrile heat, probably by influencing metabolism. They are therefore **antipyretics.** A single dose of 20 to 30 grs. of sodium salicylate may bring down the temperature of 105° F to 101° F in 2 or 3 hours.

Skin.—Salicylic acid and sodium salicylate do not increase perspiration in health, but in fevers they produce a copious sweating. Salicin and salol do not cause diaphoresis in moderate doses. The writer has seen a boy 12 years old, sweat continuously for two weeks after taking 90 grs. of sodium salicylate in 4 days. Urticaria and erythema sometimes break out.

Liver.—They are direct **hepatic stimulants**, sodium salicylate or salicylic acid being more powerful. Not only the bile secreted is increased, but it is rendered thin and watery.

Micro-organisms.—Salicin and sodium salicylate have decidedly **antiperiodic** property, but it is to be proved how far they can affect the malarial parasites.

Nervous system.—Their action on the nervous system is ill understood. They produce a train of symptoms identical with cinchonism (see salicylism)

Kidneys.—Salicylic acid is excreted in the urine as salicyluric acid and sodium salicylate, which is broken up into salicylic acid by the phosphoric acid in the urine. It can be detected in 10 to 30 minutes in the urine after ingestion, but its excretion is slow. It sometimes causes nephritis with bloody and albuminous urine. Large doses increase the excretion of urea and uric acid, and give sometimes to the urine a greenish color, due to the presence of indican or pyrocatechin. It renders the urine **antiseptic** and **increases its acidity**. It has a gentle stimulating and disinfecting influence on the urinary passages. The urine of the patients taking salicylic acid present a **purple color** on the addition of a drop of Tr. Ferri Perchlorid.

Uterus.—Some think that salicylic acid is an **emmenagogue** and causes **abortion**, but there is no sufficient evidence to confirm this statement.

Elimination.—Salicylates are thrown off chiefly by the urine, and to a less extent by the sweat, saliva, bile, sputum and fæces.

Acute toxic action or **Salicylism**.—The symptoms are identical with cinchonism. Buzzing in the ears, disturbed vision and headache are the early symptoms. When they appear, the further administration of the drugs is to be suspended. If the drugs are pushed on, nausea, vomiting, involuntary evacuation, deafness. delirium, flushed face, weak and irregulur pulse, weak shallow breathing, epistaxis, hæmaturia, albuminuria follow. If still persisted in, death may occur from either cardiac or respiratory paralysis. Charteris has demonstrated that most of the toxic symptoms are referable to the impurities of the synthetic product. Natural salicylic acid or its salts rarely produce toxic symptoms.

THERAPEUTICS OF SALICYLIC ACID, SALICIN AND SALOL.

Externally.—Salol is rarely employed, though it may be dusted over **wounds** and **sores**. With starch or talc (1 to 1), it may be employed as a dusting powder in **erysipelas** and **fetid ozœna.** Collodium Salol relieves pain in **acute rheumatism**. Salicylic acid is largely employed in surgical practice in the form of a lotion, ointment, lint, cotton, &c. Small **epitheliomas** and **chancres** soon heal, when pure acid is daily dusted over them. In **lupus**, **corns** and **tylosis** Collodium Salicylas is a useful application. A hot strong solution is recommended in **acne**, and an ointment containing ½ dr. of carbolic and salicylic acids each in 1 oz. cures **ringworm**. Being non-volatile, it is not an effective antiseptic for deep suppurating wounds. Pulv. Salicylas c. Talco is an excellent application for checking **excessive sweating** in phthisis, and the **fetid perspiration** of the feet and arm-pits. A 1 to 4 p.c. solution, or an oinment (1 to 6) often **checks** the **itching** of **eczema, intertrigo** and **urticaria.**

Internally —Salicylic acid is locally applied to **diphtheritic membranes**. Salicylic acid and salol are both used as internal antiseptics, the former in **sarcinous vomiting** and **fermentative dyspepsia**, the latter in **dirrrhœa, dysentery and cholera.** On account of its remote antiseptic action on the urine, salol is prescribed in **vesical catarrh, gonorrhœa** and after **operations on urinary organs.**

As an *antirheumatic*, salicylic acid and salicylates are considered specifics for **acute rheumatism**, possibly by setting free salicylic acid in the inflamed part by the carbonic acid in it. They reduce the temperature, lessen the swelling, and relieve the pain, if 20 to 30 grains are given every 2 hours, until 4 to 6 doses are swallowed, and then at longer intervals. Even after an apparent cure, they should be continued for one or two weeks. It is said that liability to cardiac complications is minimised by salicylic acid treatment, but many doubt this assertion. In **hyperpyrexia** of rheumatism, salicylates are of no use. In chronic **rheumatoid arthritis, gout, gonorrhœal rheumatism**, opinions differ as to their utility. Where sodium salicylate is contra-indicated, salicin may be given with advantage.

As an *antipyretic*, sodium salicylate and salicin may often be usefully employed in **typhoid, remittent, intermittent, inflammatory** or **specific fevers**. In some chronic **malarial fevers**, salicin and sodium salicylate act as better antiperiodics than quinine or arsenic. Sodium salicylate 3 grs. given hourly gives better result in **quinsy** than aconite or guaiacum.

As a *hepatic stimulant*, all these drugs may be given in **torpidity of the liver** and **catarrhal jaundice**, but sodium salicylate and salol are more effective. Both of them can be used as a solvent of **gall-stones**.

As an *analgesic*, sodium salicylate and salol may be given in **neuralgias** and **lumbago**, but the former is considered to be the best remedy for **sciatica**. In **chronic sciatica**, it gives the best result when given with iodides.

Sodium salicylate has been found temporarily to reduce the quantity of sugar of the urine in **diabetes**.

Prescribing hints.—Sodium salicylate is best given in solution. If mixed with ammonia, the mixture turns from **pale-yellow** to **brown** on exposure to air, when the bottle is half full. When given with quinine or citric acid, precipitates fall to the **bottom** (see p. 83).

Caution.—The natural or the physiologically pure artificial salts are alone to be used. With caution they should be given to children, old and weak individuals, and persons suffering from cardiac and renal diseases. The administration of the drugs is to be suspended if headache, deafness and ringing in the ears show themselves.

ACIDUM SULPHUROSUM. Sulphurous Acid. H_2SO_3.

Source.—An aqueous solution containing 6·4 p.c. of hydrogen sulphite, H_2SO_3, corresponding to 5 p.c. by weight of SO_2. The sulphurous anhydride may be prepared by burning sulphur in air or oxygen, or by boiling sulphuric acid with carbon, mercury, or copper.

Characters—A colorless liquid with a pungent sulphurous odor. Sp. gr. 1·025. *Impurities.*—Sulphuric acid, mineral matters.

Action.—Antiparasitic, antiseptic. **B.P. Dose.**—½ to 1 dr.

Official Preparation.

1. **Sodii Sulphis.** Sodium Sulphite.—See Sodium Salts.

Non-official Preparation.

1. **Sodii Hyposulphis** —*Dose.*—10 to 60 grs. As a lotion (1 in 10) for chloasma, ringworm, &c. In flatulent dyspepsia 5 grs. 2 hours after meals.

Pharmacology and Therapeutics.

Externally.—Sulphurous acid is a powerful **deoxidising agent**, a **disinfectant**, a **deodorant** and an **antiseptic**. Sulphurous acid gas is chiefly used for disinfecting infected rooms. Disinfection is best carried on by carefully closing all doors and windows, crevices being pasted over with paper, and sulphur being burnt in the room for at least six hours. Metallic substances left in the room should be greased, and colored fabrics removed, as the gas has a bleaching property. Infected clothes may also be disinfected by sulphur fumes. A lotion (2 drs. to 1 oz.) is said to be efficacious in **ringworm, foul ulcers,** and **chloasma.** Sulphur fumigation quickly removes **scabies,** if it is resorted to after a hot water bath with friction. (see p. 70.)

Internally.—Its spray cures **gangrenous stomatitis** and **diphtheritic ulcers.** On the stomach and intestine it produces the same disinfecting and antiseptic effects as on the skin and is absorbed as a sulphate. It is sometimes given with benefit in **pyrosis** and **fermentative dyspepsia** due to sarcinæ. It is not now considered to be a prophylactic for **cholera,** or a specific for **zymotic** diseases. Sulphites and hyposulphites may be used with the same effects as the acid.

ACIDUM TANNICUM. See Galla.

ACIDUM TARTARICUM. See page 186.

ACONITI RADIX. Aconite Root. N.O. *Ranunculaceæ.*

Syn.—Monk's hood. **Syn. I.V.**—*kátbish, Dudhiá bish,* Hind.

Habitat.—Britain, the Alpine and the Hymalya mountains.

Source.—Dried roots of *Aconitum Napellas* cultivated in Britain, collected in the autumn.

Characters.—2 to 4 in. long, $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter at the upper extremity, gradually tapering below; marked with the bases of rootlets and scars and crowned with the *remains of an undeveloped bud*; *dark-brown* externally; *whitish and starchy* internally; no odor; cautiously chewed produces a sensation of *tingling* and *numbness.*

Identification.—It resembles *horse radish* (*q.v.*) from which it is distinguished by its brown, black color, starchy fracture and the tingling sensation produced in the mouth by chewing; and resembles *jalap* (*q.v.*).

Composition.—(1) *Aconitine* the chief active principle. (2) *Benzaconine.* (3) *Aconine.* (4) *Aconitic acid.*

Action.—A powerful poison. A cardiac depressant.

OFFICIAL PREPARATIONS.

1. **Linimentum Aconiti,**—1 in 1½. A local anodyne and sedative.
2. **Tinctura Aconiti.**—1 in 20. **B.P. Dose.**—5 to 15 ms., *Repeated Dose.*—1 to 3 ms.
3. **Aconitina.**—See below.

NON-OFFICIAL PREPARATIONS OF THE ACONITE ROOT.

1. **Chloroformi Aconiti, B.P.C.**—Root 20 ozs., Strong Ammonia Solution 1½ ozs., Water 20 ozs., Chloroform *q.s.* Macerate with ammonia and water for 4 hours. Dry and powder. Macerate for 24 hours with chloroform 20 ozs. in a percolator, and percolate slowly to 30 ozs. Mixes with oils and liniments. A powerful sedative in neuralgia, &c.
2. **Linimentum Aconiti Comp. A.B.C. Liniment.**—Aconite, Belladonna and Chloroform liniments in equal parts.

ACONITINA. Aconitine. $C_{33}H_{45}NO_{12}$.

Source and Characters.—A colorless alkaloid obtained from aconite root. *Solubility.*—Readily in chloroform and alcohol 90 p.c., less readily in ether, nearly insoluble in water.

Action.—A virulent poison. Should never be used internally.

OFFICIAL PREPARATION.

1. **Unguentum Aconitinæ.**—1 in 50. Action is the same as that of the liniment.

NON-OFFICIAL PREPARATION.

1. **Oleatum Aconitinæ.**—Aconitine 2 grs., Oleic Acid 98 grs. Dissolve. A mild local sedative.

PHARMACOLOGY.

Externally.—When applied to the skin or mucous membrane, aconite first **stimulates** then **paralyses** the **terminations of the sensory nerves**, thereby causing **tingling, numbness and anæsthesia**.

Internally. **Gastro-intestinal tract.**—In medicinal doses, well diluted, aconite produces no tingling or numbness in the mouth. In large doses, it causes **gastro-intestinal irritation**, such as nausea, vomiting, diarrhœa, &c. Aconitine is readily absorbed, and can increase **salivary** and **intestinal secretions**.

Heart.—In minute doses (1 m. of the Tr.) it **slows and steadies the pulse**, but in larger doses **paralyses the heart, reducing the force, volume and frequency** of the pulse. In still larger doses, the cardiac beat becomes feeble, irregular and accelerated, stopping at last in diastole. This is due to its action either on the **vagal roots**, or on the **muscular fibres of the heart**. The **blood-pressure falls** chiefly from the paralysis of the heart, and to some extent from that of the **vasomotor centre**.

Respiration.—After a brief stimulation respiration becomes **slow, deep, irregular and dyspnœal** owing partly to the **paralysis of the respiratory centre**, and partly to the depressed condition of the circulation and to the irritating effect on the motor centres.

Temperature.—A febrile temperature is **lowered by** aconite, caused probably by its sedative effect on the heart, respiration, increased diaphoresis and diminished metabolism.

Nervous system.—Whether applied locally or taken internally, aconite first **stimulates** then **depresses the periphery of the sensory nerves**. The brain remains unaffected. The **pupils** first contract then dilate. The **motor centres** in the spinal cord are **first stimulated then depressed,** though to a slight extent, by large doses, producing first clonic convulsions then muscular weakness. The **reflex action** of the cord is diminished.

Skin.—Perspiration is **increased,** the mode of action is not known. It sometimes gives rise to an erythematous rash.

Kidneys.—Aconite acts as a mild **diuretic.** The mode of **elimination** is not known.

Acute toxic action.—Within a few minutes after swallowing a poisonous dose of aconite, severe tingling and burning followed by numbness are noticed in the mouth and gullet. Intense abdominal burning; vomiting; cold clammy or profuse sweating; tingling, formication and numbness of the skin; small, feeble, irregular pulse; fixed, staring eyes with dilated pupils; difficult respiration; muscular weakness; prostration; fainting; sometimes convulsions; and lastly death either from asphyxia or occasionally from syncope—are the symptoms of poisoning by this drug. Consciousness remains clear, more or less, till death.

Antidotes.—Emetics, pump, stimulants, hot bottles, friction, sinapisms to the heart. Digitalin, strychnine and atropine are its physiological antidotes. Amyl nitrite inhalation is recommended by Murrell.

Physiological antagonists.—Digitalis, strychnine, atropine, ammonia, ether and alcohol.

The action of the remaining alkaloids is very peculiar as will be seen from the following:—

Benzaconine.—It is bitter and less toxic and does not cause tingling. Its action is entirely antagonistic to that of aconitine. It slows the pulse-beat, the ventricles contracting once for every two or three auricular contractions. It interferes with the motor nerves and does not paralyse the sensory nerves.

Aconine, though bitter, does not cause numbness or salivation. It strengthens the ventricular systole and opposes inco-ordination of the heart-beat which aconitine causes. In large doses, it depresses respiration and motor nerves.

THERAPEUTICS.

Externally.—Aconite in the form of a liniment or ointment is painted on or rubbed in to relieve pain in **neuralgia, sciatica, muscular rheumatism** and **inflammatory joint affections.** An admixture of chloroform increases its efficacy, as it facilitates absorption. Therefore, Chloroformum Aconiti, B.P.C. or the A.B.C. liniment is more effective than the B.P. preparation.

Internally.—Aconite is not so largely used now in fevers as before. Its use is confined chiefly to **inflammatory fevers**, such as pneumonia, pleurisy, peritonitis, pericarditis, erysipelas, acute rheumatism, gout, gonorrhœa, otitis, urethral fever, tonsillitis, sorethroat, &c. In many of these cases it should be given in small doses (1 or 2 ms. of the tincture) rather frequently until there is a fall of temperature, sweating and relief of the symptoms. It should never be given in **continued fevers**, such as typhus, typhoid and low remittents. It sometimes does good to **nervous palpitation, compensative cardiac hypertrophy** or **aneurism**. It is an excellent remedy for re-establishing menstruation suddenly arrested by cold. A few drops of the tincture given at bed time have a quieting effect on the restlessness of many neurotic patients. As a local gastric sedative, it has been prescribed for the **vomiting of pregnancy**.

Caution.—Old persons or those who suffer from cardiac and respiratory disorders, should not be treated with this powerful remedy. Children and plethoric subjects bear it well.

Prescribing hints.—If aconitine ointment is ordered, a small bit of the size of a bean is to be rubbed in with the tip of the finger over the painful part ; care being taken that it does not come in contact with an abraded and mucous surface. If applied over the temples, see that it does not get into the eyes. It is a safer procedure, to order the tincture in 1 m. doses every 15 or 30 minutes, until the pulse begins to be affected, then gradually at longer intervals according to the needs of the patient ; than to commence the B. P. dose at the outset.

ADEPS. Lard.

Syn. I. V.—*Suarke charbi*, Hind.

Source.—The purified fat of the hog, *Sus scrofa.*

Characters.—A soft, white, neutral, fatty substance, melting at 100° F. *Impurities.—Starch, common salt.*

Composition.—(1) *Olein.* (2) *Stearin.* (3) *Palmitin.*

Enters into.—Emp. Canthar., Pil. Phosph. and 8 ointments, and the

Official Preparations.

1. **Adeps Benzoatus** (see Addendum).—1 in $33\frac{1}{3}$. *Enters into.*—12 ointments.
2. **Adeps Induratus** is the ordinary lard from which a portion of the oil has been removed by pressure. For use in India and the Colonies when high temperature renders the ordinary lard too soft.

ADEPS LANÆ. Wool Fat.

Source.—The purified cholesterin fat of sheep's wool, obtained by heat and pressure.

Characters.—Yellowish, tenacious, unctuous, inodorous. *Solubility.*—In chloroform, ether, partially in alcohol 90 p.c.

OFFICIAL PREPARATION.

1. **Adeps Lanæ Hydrosus.** *Syn.—Lanoline. Enters into.*—Ung. Conii and Ung. Hamamelidis.

ACTIONS AND USES.

Lard and wool fat are largely employed in pharmacy for making certain ointments. They are **emollients.** Adeps lanæ is a non-irritant and is readily absorbed, and is therefore used as a basis for the ointment of many active drugs. Benzoated lard does not turn rancid but it is rarely used now.

ADHATODA. Adhatoda. N.O. *Acanthaceæ.*

(*Ind. and Col. Addendum*)

Syn. I. V.—*Bákas*, Beng. *Arushá*, Hind. *Adulsâ*, Bom.

Habitat.—India, Eastern Colonies.

Source.—The fresh and the dried leaves of *Adhatoda Vasica* (*Justicia Adhatoda*).

Characters—Fresh leaves 5 to 6 in. long, 1½ in. broad, lanceolate, entire, taper-pointed, smooth. Dried leaves dark-green. Their odour is tea-like and their taste bitter.

Composition.—(1) *Vasicine* a crystalline alkaloid. (2) An *Organic Acid.* (3) *Ammonia.*

OFFICIAL PREPARATIONS.

1. **Extractum Adhatodæ Liquidum.**—Dried powder 20 ozs., Alcohol 60 p.c. *q. s.* to produce 1 pint by percolation and evaporation. **B.P. Dose.**—20 to 60 ms.

2. **Succus Adhatodæ.**—Freshly expressed and strained. **B.P. Dose.**—1 to 4 drs.

3. **Tinctura Adhatodæ.**—Dried powder 2½ ozs., Alcohol 60 p.c. *q. s.*, to produce 1 pint by percolation. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Adhatoda Cigarettes.**—In asthma. 2. **Decoctum Adhatodæ.**—Powdered leaves 4 ozs. water 1 pint; boil for 10 minutes. *Dose.*—1 to 2 ozs.

3. **Syrupus Adhatodæ.**—Can be prepared like Syrupus Hemedesmi, or by adding liquid extract to the syrup. *Dose.*—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The leaves possess an **insecticide** property, and are therefore considered to be a valuable remedy for blight on the tea and other crops. Dr. Watt suggests its use as a **germicide** for drinking water.

Internally.—Both the leaves and roots are a stimulant **expectorant** and **bronchial antispasmodic.** The roots may be used as a substitute for senega. Adhatoda is an excellent remedy for **chronic bronchitis, phthisis** and **bronchial asthma**. The decoction of the root-bark is frequently used by the natives of this country in catarrh, mild fever and bronchitis. The writer considers it useful in mild forms of **pertussis**, especially if it is complicated with bronchitis. The leaves smoked in the form of a cheroot relieve **asthma**, as they evolve ammoniacal vapor when burnt.

ÆTHER. Ether. ·Ethyl Oxide. $(C_2H_5)_2O$.

Syn.—Ethylic Ether. Sulphuric Ether.

Source.—From ethylic alcohol by interaction with sulphuric acid, containing 92 p.c. of ethyl oxide by volume.

Characters.—A colorless, volatile, inflammable liquid ; odor strong, characteristic ; sp. gr. 0·735. *Solubility.*—Freely in alcohol 90 p.c., chloroform, fixed and volatile oils. *Impurities.*—Water, alcohol, free acid, oil of wine.

Identification.—Resembles chloroform, from which it differs by its characteristic odor and inflammability.

Action.—Diffusible stimulant, local and general anæsthetic.

B.P. Dose.—10 to 30 ms. for repeated administration, and 40 to 60 ms. for a single administration.

Enters into.—Collod. Flexile, Tr. Lob. Ether., and the

OFFICIAL PREPARATIONS.

1. **Æther Purificatus.**—Ether from which water and ethylic alcohol are removed by washing and distillation. Sp. gr. 0·720.
2. **Spiritus Ætheris.**—1 in 3. **B.P. Dose.**—20 to 40 ms. for repeated use, 60 to 90 ms. for a single dose. *Enters into.*—Tr. Lobel, Æther.
3. **Spiritus Ætheris Compositus.** *Syn.—Hoffmann's Anodyne.*—1 in 8 nearly. **B.P. Dose.**—The same as that of Æther.

NON-OFFICIAL PREPARATIONS.

1. **Æther Methylatus.**—Prepared from methylated alcohol. Sp. gr. 0·717. Suitable for local anæsthesia and inhalation.
2. **Spiritus Ætheris Muriaticus.** *Syn.—Sp. Salis Dulcis. Clutton's Febrifuge Spirit.*—Used in febrile affections. *Dose.*—30 to 60 ms.

PHARMACOLOGY OF ETHER.

The action of ether is identical with that of chloroform.

Externally.—Being extremely volatile, ether freezes and depresses the peripheral ends of the sensory nerves of the part to which it is applied, and is therefore a **local refrigerant** and **anæsthetic**. These local actions are best obtained when it is sprayed over. If the freezing is continued too long, the part may die. If it is rubbed in, or its evaporation is stopped, it acts as a **rubefacient** and **vesicant**.

Internally. **Mouth.**—It produces a burning, disagreeable, characteristic taste in the mouth, and stimulates reflexly **salivary secretion**.

Stomach and intestine.—It is quickly absorbed, and stimulates the blood-vessels, nerves and muscular fibres of the stomach, thereby increasing the secretion of the gastric juice and expelling gas. It is therefore a gastric **stimulant** and **carminative.** It reflexly stimulates the bowels, heart and lungs. It is an **intestinal antispasmodic** and appears to excite the action of the liver and pancreas.

Heart and lungs.—It reflexly as well as after absorption stimulates the heart and lungs, and raises the blood-pressure; improving the tone and frequency of the pulse and respiration. It is therefore a good **cardiac stimulant.**

Nervous system.—Ether acts on the nervous system in the following order.—1st the cerebrum, 2ndly the sensory spinal centres, 3rdly the motor spinal centres, 4thly the sensory centres in the medulla, and 5thly the motor centres in the medulla. Like chloroform it produces **general anæsthesia** when inhaled, consequently the description of the employment of chloroform (which see) as an anæsthetic applies generally to that of ether, except the following characteristic differences given below :—

Ether.	**Chloroform.**
1. Ether should be used in a concentrated form ; 70 p.c. of ether and 30 p.c. of air.	Chloroform must be given well diluted ; 95 to 97 p.c. of air and 5 to 3 p.c. of chloroform.
2. Ether being inflammable, no fire should be brought close to the mouth.	Chloroform is not inflammable.
3. A large quantity is needed to produce anæsthesia (Whitla used in one case 1½ pints).	A small quantity, say 3 drs. to 1 oz. is enough.
4. The smell of ether is disagreeable.	The smell of chloroform is not disagreeable.
5. With ether, the stage of stimulation is very much protracted, consequently there is more struggling.	With chloroform, the stage of stimulation is shorter, and therefore less struggling.
6. The stage of anæsthesia is shorter, and the degree of anæsthesia is less profound.	The stage of anæsthesia is more complete, and the degree more profound.
7. The fall of temperature is great (Dr. Hare observed 4.4°F. in man).	The fall of temperature is slight.
8. More bronchial than gastric irritation.	Less bronchial but more gastric irritation.
9. Cardiac, respiratory and vasomotor centres are not readily paralysed ; hence ether is a *safer* anæsthetic.	Cardiac, respiratory and vasomotor centres are readily paralysed; hence chloroform is *not a safer* anæsthetic.
10. Complications of the lungs, such as bronchitis, pneumonia are more frequent.	Complications of the lungs are less frequent.

Ether.	**Chloroform.**
11. Elimination is very slow, consequently the smell hangs on the body for a long period.	Elimination is rapid, consequently the smell does not hang on so long.
12. Death from syncope during inhalation is less probable in subjects of cardiac weakness.	Death from sysncope is more probable in subjects of cardiac weakness.

THERAPEUTICS OF ETHER.

Externally.—In the form of a spray, ether relieves the intense pain of **neuralgia** and of superficial minor **surgical operations.** For the latter purpose, the part must be frozen for the time being. As this anæsthesia does not extend into the deeper tissues, ether is not a suitable local anæsthetic for deep surgical operations. Subsequent tingling and smarting are also a drawback. In like manner, the lightening pains of locomotor ataxy, and choreac and tetanic spasms may be relieved.

Internally. **Stomach and intestine.**—Like alcohol and chloroform, it may be given in some forms of **dyspepsia** to expel gas and relieve gastrodynia and cramps. It also benefits those forms of dyspepsia which are caused by defective pancreatic secretion. It improves the taste of, and helps the assimilation of, cod-liver oil when combined with it. Hoffmann's Anodyne is an excellent reliever of **intestinal and biliary colic**. Durande's mixture of ether and turpentine is said to act as a **biliary lithontriptic** in gallstones.

Heart and lungs.—It is an excellent cardiac and respiratory stimulant, whether given by the mouth, or hypodermically (10 to 40 ms.), in **syncope, palpitation** or **cardiac failure** from any cause, but its action being transient, it has to be repeated. In full doses, it relieves pain and distress in **angina, spasmodic bronchitis** and **asthma**. Sometimes it may be given with advantage to tone up, and allay the irritability of the heart in **delirium tremens.**

Nervous system.—For its antispasmodic property, it is occasionally given in **hysterical and epileptic threatenings.**

General anæsthesia.—To produce complete insensibility, pure ether must be inhaled The mode of inhalation and the necessary precautions are almost the same as those of chloroform inhalation (which see). Inhalation is commenced by pouring an ounce ef ether on a sponge in an inhaler, and kept up till the anæsthesia is induced. The effect is more rapid if the sponge is wrung out of hot water. Either pure ether, A. C. E. Mixture (alcohol absolute 1, chloroform 2, ether 3), or E_2C_1 (ether 2, chloroform 1) may be continued, if the enæsthesia requires to be kept up for a long time. A few whiffs of nitrous oxide gas in the beginning is much pleasanter for the patient. Dr. Buxton recommends inhalation of ether with oxygen in certain cases, where the induction presents difficulties from spasm, cough, holding of breath, struggling with cyanosis, in alcoholics and in persons of weak vitality.

Caution.—The inhalation of ether is contra-indicated in those operations of the mouth which require cauterising or the use of artificial light. Ether is not a suitable anæsthetic for children, on account of its pungent vapor, and for causing bronchial irritation. In laryngeal and tracheal operations, it is not suited also, because it causes bronchial irritation and secretion of ropy mucus.

Prescribing hints.—Ether is used as a *spray* to produce local anæsthesia. With syrup and water, or with other diffusible stimulants it is given internally. In 15, 20, 30 or 40 m. doses it is injected subcutaneously every half or one hour in syncope, &c.

ÆTHERIS NITROSI SPIRITUS. Spirit of Nirous Ether.

Syn., B.P.—Sweet Spirit of Nitre.

Source.—Obtained by distilling a mixture of alcohol 90 p.c. nitric and sulphuric acids and copper ; containing ethyl nitrite 2½ p.c.

Characters.—A limpid, faintly yellow, inflammable liquid ; odor penetrating apple-like ; taste characteristic ; sp. gr. 0·838 to 0·842. *Impurities.*—Excess of acid and deficiency of ethyl nitrite.

Composition.—Ethyl nitrite, aldehyde, acetic ether, acetic acid, &c.

Identification.—Its peculiar apple-like odor helps recognition.

Incompatibles.—Potassium and other soluble iodides, iron sulphate, antipyrin, salicylates, tannic and gallic acids, tincture of guaiacum and emulsions.

Dispensing hints.—It should be kept in small hermetically sealed bottles in the dark. The addition of a few crystals of potassium bicarbonate to the liquid keeps it neutral. It can be extemporaneously prepared by mixing **Itrosyl** (a concentrated form of nitrous ether) 1, with alcohol 90 p.c. 19.

Action.—Diaphoretic, diuretic, antispasmodic. **B.P. Dose.**—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.

PHARMACOLOGY.

Externally.—It causes a slight **local anæsthesia** by evaporation, when applied to skin.

Internally.—It possesses the combined properties of ether and nitrites which it contains, but in a milder degree. It is therefore a mild **diffusible stimulant, antispasmodic** and **carminative.**

Heart, blood and blood-vessels.—It diminishes the oxygenating power of the red blood corpuscles. It **accelerates the cardiac activity** and **relaxes the peripheral blood-vessels**, but not to such an extent as the nitrites. It lowers the arterial tension like amyl nitrite, and according to Prof. Leech its effect on the circulation is more persistent than that of amyl or other nitrites. By dilating the renal and cutaneuous vessels, it acts as a **diuretic** and **diaphoretic** respectively. Its **antipyretic** property is no doubt due to diaphoresis and changes in the blood corpuscles.

Elimination.—It is excreted by the kidneys and the lungs.

THERAPEUTICS.

Internally.—Spirit of nitrous ether forms one of the chief ingredients of a fever mixture, and is used in **catarrhal, intermittent, remittent, typoid** and other febrile diseases. It is said to be specially serviceable in **fevers during dentition.** As a **diuretic,** it is an excellent remedy for **Bright's disease** after the acute inflammatory stage is passed. Its effects are most marked in **dropsy** due to renal but not to cardiac disorders. It may be employed in **angina pectoris,** and to relieve the cardiac distress of the **dilated heart,** due to chronic **nephritis,** but nitrites do this better.

ETHYL NITRITIS LIQUOR. Solution of Ethyl Nitrite.

Source.—A mixture of 95 parts of absolute alcohol with 5 parts of glycerin by volume, containing when freshly made 3 p.c. and when long kept not less than 2½ p.c. by weight of ethyl nitrite; which is obtained by the interaction of alcohol 90 p.c., sodium nitrite, diluted sulphuric acid at a low temperature.

Characters.—A limpid, colorless, inflammable liquid; odor and taste apple-like; sp. gr. 0·823 to 0·826. *Impurities.*—Acid, aldehyde, less ethyl nitrite.

Dispensing hints.—Should be stored in small bottles.

B.P. Dose.—20 to 60 ms.

PHARMACOLOGY AND THERAPEUTICS.

Its actions and uses are like those of amyl nitrite (which see), but less rapid and more persistent. Liqr. Ethyl Nitrite is a more trust-worthy preparation than Spt. Æther. Nitrosi and is therefore introduced into the B.P.

ÆTHER ACETICUS. Acetic Ether. $CH_3 \cdot COO(C_2H_5)$.

Source.—Prepared by distilling a mixture of ethylic alcohol sulphuric acid, and dried sodium acetate, and purifying by the action of potassium carbonate by digestion, and subsequent separation by distillation.

Characters.—A colorless liquid with a fragrant odor; sp. gr. 0·900 to 0·905. *Solubility.*—1 in 10 of water, freely in alcohol 90 p.c., and ether.

B.P. Dose.—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.

Enters into.—Liquor Epispasticus for dissolving cantharidine.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Its action to a great extent resembles that of Sp. Æther. Co. but has a more agreeable taste and odor. It is a **stimulant, carminative** and **antispasmodic.** Its inhalation (30 ms. in water 1 pint) allays **laryngeal irritation.**

AGROPYRUM. Couch Grass. N.O. *Graminaceæ.*

(*Ind. and Col. Addendum*)

Syn. B.P.—Triticum.

Habitat.—Australasia, Eastern and Northern American Colonies.

Source.—The dried rhizome of *Agropyrum repens* (*Triticum repens*).

Characters.—Pale yellow, $\frac{1}{12}$ to $\frac{1}{10}$ in. in diameter; usually in sections $\frac{1}{3}$ to $\frac{1}{4}$ in. long. Furrowed longitudinally, hollow except at the nodes. No odor. Taste faint sweetish.

Composition.—Gummy and saccharine substances.

OFFICIAL PREPARATIONS.

1. **Decoctum Agropyri.**—1 in 20. **B.P. Dose.**—½ to 1 oz.
2. **Extractum Agropyri Liquidum.**—Couch grass 20 ozs., Alcohol 90 p c. and Water q. s. By digestion and evaporation to 1 pint. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is a **demulcent** and **diuretic,** being largely employed in **cystitis** and **irritation of the urinary passages.** Its decoction well diluted may be employed as a diluent. It is the fresh rhizome which possesses these properties, the dried one being inert.

AJOWAN OLEUM. Ajowan Oil. N.O. *Umbelliferæ.*

(*Ind. and Col. Addendum*)

Syn. B.P.—Ptychotis Oil. **Syn. I.V.**—*Jowaner tel,* Beng. *Ajowán ke tel,* Hind.

Habitat.—India, Eastern Colonies.

Source.—The oil distilled from the fruit of *Carum copticum.*

Characters.—Colorless, odor and taste of the thyme; sp. gr. 0.917 to 0.930. If cooled to 32° F. should yield 30 to 36 p.c. of crystalline *Thymol,* known in the Indian bazaars as *ajowán ke ful,* and prepared in the Central India.

Action.—Stimulant, antispasmodic, carminative and antiseptic. **B.P. Dose.**—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The actions and uses of the oil resemble those of thymol (which see). It is a capital medicine for diguising the nauseous taste of drugs and correcting the griping of purgatives.

Internally.—The **Omum water** or *Ajawan ke arak* distilled from the fruits is a valuable **carminative** and **antispasmodic** in *colic* and *flatulent dyspepsia.*

Ajowan is often chewed with *pán*, or taken with salt for indigestion.

ALCOHOL ABSOLUTUM. Absolute Alcohol.

Source.—Ethyl hydroxide, C_2H_5OH with 1 p.c. of water by weight. Obtained by the removal of water from less strong ethylic alcohol and subsequent distillation.

Characters.—A colorless, volatile, hygroscopic liquid; sp. gr. 0·794 to 0·7969.

Action.—A powerful caustic, possessing a strong affinity for water; but is never used as such.

Enters into.—The preparation of Chloroform and Liq. Sod. Ethyl.

SPIRITUS RECTIFICATUS. Rectified Spirit. S.V.R.

Source.—A liquid containing 90 p.c. by volume of ethyl hydroxide and 10 p c of water; obtained by the distillation of fermented saccharine liquids. This contains 1·35 p.c. by volume more of ethyl hydroxide than S V.R. of B.P. 1885.

Characters.—A transparent, colorless, mobile, inflammable liquid; odor characteristic, pleasant; taste spirituous burning; sp. gr. 0·8340.

Identification.—Its characteristic smell helps diagnosis. It should not be mistaken for other spirituous substances.

Dispensing hints.—There is a contraction of volume and rise of temperature on mixing it with water. The cooled liquid should be used.

OFFICIAL DILUTED ALCOHOLS.

1. **Alcohol 70 p.c.**—To 100 fl. ozs. of alcohol 90 p.c. add 31 fl. ozs. of distilled water. Sp. gr. 0·8900.
2. **Alcohol 60 p.c**—To 100 fl. ozs. of alcohol 90 p.c. add $53\frac{2}{3}$ fl. ozs. of distilled water. Sp. gr. 0·9135.
3. **Alcohol 45 p.c.**—To 100 fl. ozs. of alcohol 90 p.c. add $105\frac{1}{3}$ fl. ozs. of distilled water. Sp. gr. 0·9436.
4. **Alcohol 20 p.c.**—To 100 fl. ozs. of alcohol add $355\frac{3}{4}$ fl. ozs. of distilled water. Sp. gr. 0·9760.

NON-OFFICIAL DILUTED ALCOHOLS.

1. **Spiritus Tenior.** *Proof Spirit.*—When the sp. gr. of alcohol is 0 920, it is called **proof spirit.** If lighter than this it is said "Above proof", and if heavier than this it is called "Under proof."
2. **Spiritus Methylatus.** *Methylated Spirit*—An impure alcohol containing about 10 p.c. of wood naphtha, and ½ p.c. of petroleum oil which render it too nauseous for drinking. It is cheap because it is duty-free. Liniments and tincture of iodine (for external use) are sometimes prepared as cheaper substitutes.

SPIRITUS VINI GALLICI. Brandy.

Source.—Distilled from wine and matured by age, containing $36\frac{1}{2}$ p.c. by weight or $43\frac{1}{2}$ p.c. by volume of ethyl hydroxide.

OFFICIAL PREPARATION.

1. **Mistura Spiritus Vini Gallici.** *Syn.—Brandy Mixture. Egg-flip.*—**B.P. Dose.**—1 to 2 ozs.

VINUM AURANTII. Orange Wine.

Source—Prepared by fermenting saccharine solution to which the fresh peel of bitter orange is added. Contains 10 to 12 p.c. by volume of ethyl hydroxide.

Enters into.—The preparation of Vin. Ferri Citratis, and Vin. Quiniæ.

NON-OFFICIAL PREPARATION.

1. **Vinum Aurantii Detannatum, B.P.C.**—Orange wine 1 gal., gelatin ¼ oz. Decant after 14 days' maceration.

VINUM XERICUM. Sherry.

Source.—A Spanish wine containing not less than 16 p.c. by volume of ethyl hydroxide.

Characters.—Pale yellowish-brown. *Impurities.*—Salicylic acid.

Enters into.—The preparation of Vin. Antim., Vin. Colch., Vin. Ferri, and Vin. Ipecac.

NON-OFFICIAL PREPARATION.

1. **Vinum Xericum Detannatum, B.P.C.**—Sherry 1 gal., gelation ¼ oz. Decant after 14 days' maceration. Both the detannated wines are suitable solvents for iron and alkaloidal salts.

The following is the list of wines shewing the amount of absolute alcohol by weight.—

Spiritus Frumenti (Whisky) 51 to 59 per cent.
Spiritus Vini Gallici (Brandy) 36.5 per cent.
Rum, Gin and Strong Liqeurs about 51 to 59 per cent.
Sherry, Port, Madeira about 16 to 22 per cent.
Champagne, Shiraz about 10 to 13 per cent.
Hocks, Burgandy about 9 to 12 per cent.
Spiritus Vini Rubri (Port) 14 to 16 per cent.
Claret 8 to 12 per cent.
Ale and Porter about 3 to 5 or more per cent.
Cider 5 to 9 per cent.
Koumiss and Ginger Beer 1 to 3 per cent.
Doasta 15 to 22 per cent. under proof.

PHARMACOLOGY OF ALCOHOL.

Externally—Alcohol is an **antiseptic**, superior to glycerin but inferior to chloroform and ether. When allowed to evaporate after application to the skin, it abstracts heat, constricts superficial blood-vessels, arrests perspiration and depresses the local sensory nerves, and thus acts as a **local refrigerant, vascular astringent, anhidrotic and anæsthetic.** On the contrary, if its evaporation is stopped or rubbed into the part, it abstracts water from the skin and renders it drier and harder. After absorption, it stimulates the blood-vessels and nerves, producing redness, heat and pain, and thus acts as a **local stimulant** and **rubefacient**. It coagulates the albumen of the tissues, but redissolves it.

Internally. **Mouth.**—Undiluted alcohol has the same action on the mouth as on the skin, causing a sort of whitish, opaque pellicle from the coagulation of the albumen soon dissolved by the tissue fluids. It **reflexly excites salivary secretion and cardiac action.**

Stomach.—Reaching the stomach, undiluted alcohol causes here too pain, burning and a feeling of warmth. In small doses diluted, it stimulates circulation, the peristalsis, secretion and absorptive power of the stomach. As a result of these actions, appetite is sharpened, digestion is promoted, and gas if generated is expelled, hence it is a **gastric stimulant** and **carminative.** By depressing the gastric nerves, it may relieve pain. By its admixture with the contents of the stomach, it splits up into **aldehyde** and **acetic acid**, and precipitates a portion of pepsin, peptones and proteids, but not to such an extent as to impair the digestive process. In large and repeated doses, it irritates the mucous membrane, increases the secretion of mucus and retards the secretion of gastric juice. If this irritation is allowed to continue, the gastric follicles atrophy and dyspepsia becomes more permanent, as is seen in the case of confirmed drunkards.

A moderate dose of alcohol (strong), *e.g.* whisky or brandy on reaching the stomach, at once **reflexly stimulates** the heart, dilates the blood-vessels of the body, especially those of the skin, and increases the functional activity of the organs; hence it is a powerful **diffusible stimulant**. This action is continued after absorption into the circulation.

Intestine.—It has a slight **astringent** effect on the intestinal mucous membrane.

Blood.—It enters the blood either unchanged or as an aldehyde more readily through the veins than the lacteals. It **binds the oxygen of the oxyhæmoglobin so firmly,** that the latter cannot take up or give off oxygen readily, and thus lessens the oxidising power of the red blood corpuscles and the oxidation in the tissues. As a result of this, there is an imperfect combustion of carbohydrates, and fat is necessarily deposited in the tissues producing **obesity**; as is often seen in habitual drinkers of extra "pegs." It first increases then reduces the amæboid movements of white corpuscles.

Circulation.—The reflex effects of alcohol on the circulation have already been noted. After absorption, its action is more marked on the heart and circulation. The pulse becomes fuller and stronger, and beats quicker, due no doubt to the increased cardiac activity, and dilatation of the peripheral arteries, from its influence on the **cardiac and vaso-dilator centres.** Hence the **blood pressure rises.** As a result of this activity, the mind becomes exhilarated, muscular power increased, more urine is passed and the skin perspires more freely. This stimulant action does not last long, and is soon followed by **depression,** which is rather persistent. It is therefore a mistake to suppose that alcohol can help a person to perform more bodily work without fatigue.

Respiration.—Alcohol first stimulates and afterwards slows respiration, either by affecting the respiratory or vasomotor centres.

Temperature.—Alcohol is a mild **antipyretic,** due to (*a*) the dilatation of the cutaneous blood-vessels, thereby producing increased perspiration and radiation, (*b*) the diminished oxidation in the tissues, and (*c*) the general depression caused by excessive doses.

Muscular system.—At first, the muscular strength is increased through the increased circulation in the nervous system, producing in larger doses inco-ordinate movements. In toxic doses, the muscular action is entirely suspended.

Nervous system.—In moderate doses, the action of alcohol on the nervous system is one of **stimulation,** due to (*a*) the increased cardiac activity, (*b*) the vascular stimulation, and (*c*) to its direct influence on the nerve-cells. In large doses, the stimulation is more pronounced though brief, and soon gives place to depression. In its progressive action, either of stimulation or depression, it follows the "**laws of dissolution**" already described in page 158. In other words, the stimulation and subsequent depression proceed from the highest functions of the brain, in a descending scale, to the lowest ones in animal life. Thus, during the stage of stimulation, the imagination becomes brighter, feelings elevated, intellect clearer, (highest functions of the brain) senses more acute, bodily activity more predominant and some of the lower appetites sharpened. The depression follows in the same wake, *i.e.* the judgment fails while the imagination, emotions and power of speech are still excited, then the imagination and will-power give way. The patient talks, laughs, sings or cries without restraint, but gradually he loses control over these functions too, his speech becomes thick, incoherent and at last suspended. His muscles next get affected, at first the delicate movements, such as writing, playing on the piano, &c. are abolished, then the other movements become inco-ordinate and paralysed. The **reflex centres** in the cord now get involved, he passes stools and urine involuntarily, and finally the **respiratory and cardiac** centres become paralysed, and the patient dies.

Skin.—Alcohol is a mild **diaphoretic,** due partly to the dilatation of the cutaneous blood-vessels and partly to its influence on the sweat-glands. But if it is taken, in larger doses, this dilatation of blood-vessels may proceed to such an extent, that death may follow from excessive radiation of heat, though the drinker may feel a sense of temporary warmth in the beginning, if his cutaneous vessels were contracted previously from cold air.

Kidneys.—Alcohol acts also as a mild **diuretic**, from the dilatation of the renal vessels. A portion of it is excreted in the urine unchanged, if large quantities are taken. Gin has a greater diuretic effect than other wines.

Metabolism.—It influences metabolism in two distinct ways, *viz*, —(1) by its **own oxidation**, and (2) by the **retardation of the oxidation in the tissues.**

(1) **Alcohol as an oxiding body.**—It has been ascertained that a portion of alcohol is oxidised like sugar or fat in the plasma, and does not become an integral part of the living cells like albumen and salts. According to Binz, 2 ozs. of absolute alcohol can yield that amount of body-heat which can be generated by 1½ ozs. of cod-liver oil.

(2) **Alcohol as a retarder of tissue-change.**—The following facts will shew how alcohol can affect metabolism :—

(*a*) If an animal is fed with moderate doses of alcohol, we observe, (1) a less quantity of oxygen is absorbed, (2) the temperature falls, (3) an increased deposit of adipose tissue takes place at the expense of the albuminous, and (4) the excretion of the normal amount of urea, uric acid, carbonic acid and salts is diminished.

(*b*) Alcohol has the property of binding the oxygen of the **oxyhæmoglobin** so firmly, that it cannot readily be taken up by the tissues (see p 214).

(*c*) It also robs the oxygen of the tissue-elements so readily, that it arrests their oxidation, consequently helps the deposition of fat.

Elimination.—By far the greater part of alcohol is oxidised as carbonic acid and water, only less than 3 p.c of it is thrown off unoxidised chiefly by the lungs, less by the kidneys and least by the skin.

Acute toxic Action.—A large quantity may cause sudden death either by reflexly arresting the heart's action, or after a short time, by paralysing the respiratory and cardiac centres. Symptoms preceding death are generally unconsciousness, fixed, contracted or dilated pupils, weak pulse, cold clammy skin, stertorous breathing, and occassionally delirium or convulsions.

Antidotes.—Emetics or stomcah pump. If the patient cannot swallow, coffee with ammonia may be injected by the pump after the stomach has been washed out. Sinapisms, cold affusion, electricity, amyl nitrite inhalation, strychnine $\frac{1}{100}$ gr. to $\frac{1}{50}$ gr. subcutaneously, may be used.

Chronic toxic action or "Alcoholism" is induced by prolonged alcoholic indulgence. Insomnia, muscular, tremor, and gastric disturbance are the early symptoms. Gastritis, peripheral or multiple neuritis, cirrhosis of the liver causing ascites, chronic interstitial nephritis causing anasarca, dilatation of the heart, gout, nervous disorders, such as delirium tremens, epilepsy, paralysis, insanity, &c., are generally the diseases which afflict confirmed drunkards. Generally they are thin, but a few, especially those who drink beer, get fat. They cannot withstand well any serious illness, such as pneumonia, and are particularly liable to attacks of phthisis. Gin drinkers mostly suffer from cirrhosis of the kidneys and liver.

THERAPEUTICS OF ALCOHOL.

Externally.—A continuous local application of a spirituous lotion with a piece of lint or rag, allowing free evaporation, (*a*) relieves some forms of **headache**; (*b*) subdues **acute inflammation**, such as cerebritis; (*c*) prevents the setting in of or allays **local inflammation**, as in sprains, bruises and boils; and (*d*) hardens the skin and obviates **threatening bed-sores** and **cracked nipples**. Sponging with alcohol and water often relieves the itching of **erythema**, **urticaria**, &c. Eau-de-Cologne or brandy is often rubbed into the body to check sweating and bring back warmth to the surface, as in **collapse** and **syncope**. Liniments containing alcohol are rubbed into the skin (*a*) to aid the absorption of inflammatory products, as in **chronic rheumatism**, **stiff joints**; (*b*) to give nutrition to tissues, as in **paralysis**; (*c*) to counter-irritate, as in **catarrh**, **bronchitis**, **pneumonia**, **pleurisy**, &c.; and (*d*) to relieve pain, as in **myalgia** and **chronic rheumatism**.

Internally. **Mouth.**—As a **local astringent**, **anodyne** and **antiseptic**, it is used in many mouth and throat diseases. Undiluted brandy held in the mouth relieves **toothache** and the pain of **follicular tonsillitis**. The latter disease is also benefited by its astringent and antiseptic properties. Port wine is sometimes used as a **gargle** in **mercurial salivation**, **sore throat** and **inflamed** and **spongy gums**.

Stomach.—As a **digestive stimulant**, alcohol may be given in small doses just before or during the meals in the following class of cases:—

1. Convalescents from acute illness with weakened appetite and digestion.
2. Patients suffering from chronic wasting diseases.
3. Town-dwellers leading a sedentary life.
4. Old and over-worked persons.

In **painful dyspepsia**, **vomiting of pregnancy** and **flatulence**, champagne or brandy with soda water is sometimes useful. A good peg of whisky or brandy with hot water often relieves **gastric spasms**. **Fainting**, **syncope** or **threatening collapse** may be averted by a single large dose of brandy or whisky by reflexly stimulating circulation. **Diarrhœa** or **cholera** in the beginning may be checked by a stiff dose of brandy.

Heart.—As a **cardiac stimulant**, the effects of alcohol are more persistent than those of ether and ammonia. Hence brandy or whisky is an excellent remedy for threatening **cardiac failure** due to shock, hæmorrhage, febrile and other diseases. In small regularly continued doses, it relieves the distress of **cardiac dilatation** without compensatory hypertrophy.

Nervous system.—Alcohol must be used with great caution in depressed conditions of the nervous system lest a bad habit be induced. Many nervous diseases do not require any alcohol. In some cases of **insomnia**, **hysteria** and **neuralgia**, alcohol no doubt affords temporary relief, but it must, if possible, be avoided for fear of generating intemperance. As to the use of wines in **acute alcoholism** (delirium tremens), opinions differ. Their use is only justifiable where the stomach cannot retain food, and then in small doses as a sustainer of life.

Kidneys.—Gin is a powerful diuretic, because it contains juniper which is also a diuretic. As alcohol is eliminated by the kidneys, and is an irritant to the mucous membrane of the urethra, it should be avoided in **gonorrhœa, gleet**, &c.

Skin.—Alcohol is rarely used as a diaphoretic, except in cases of **catarrh** or **febrile diseases.**

Fevers.—Opinions are at variance as to the efficacy of alcohol in fevers. Some consider it an essential element in their treatment, while others think it injurious. However (1) to strengthen slow, soft and frequent pulse ; (2) to diminish frequency of respiration ; (3) to moisten a dry tongue ; (4) to lessen delirium and to produce sleep ; (5) to reduce high temperature ; (6) to aid digestion ; and (7) to sustain the heart and nervous system, the judicious use of a definite amount of alcohol per day is of immense benefit to the patient, the quantity to be administered being judged by the age and the previous habits of the patient. But it must also be noted that if the indications set forth are not fulfilled, its use must be suspended.

Many cases of fevers do well without alcohol. It is his experience that will guide the practitioner when and where to use wines.

Prescribing hints.—It must be borne in mind while ordering alcohol, that its effects are modified by various circumstances, such as (*a*) the difference in the composition and strength of the alcoholic fluids used ; (*b*) the degree of their dilution with water ; (*c*) the age, toleration and habits as regards alcoholic drinks of the patient ; (*d*) the amount of exercise taken by him ; (*e*) the condition of his stomach whether empty or full ; (*f*) the condition of his excretory organs especially the kidneys ; and (*g*) the nature of the diseases for which they are given.

In many exhausting febrile or other diseases, patients can consume without intoxication a large amount of alcohol, even as much as one pint of brandy per diem. Sparkling wines (carbonic acid) facilitate absorption and produce a quicker action. Old brandy, whisky or port should be preferred as they contain less injurious ingredients. Different varieties of wines should not be given at the same time as they derange digestion. Small quantities in repeated doses with some easily digestible food are the best method of administration. Debilitated persons do well if an alcoholic drink is given an hour before food. Champagne, port, strong claret or beer may produce burning and aching of the rectum, and new and inferior brandy or whisky headache, because the latter contains fusel oil, furfural and many injurious aldedydes.

ALOE BARBADENSIS. Barbados Aloes. N.O. *Liliaceæ.*

Syn. I.V.—*Musabár*, Beng. Hind.

Habitat.—West Indian Islands.

Source.—The dried inspissated juice from the transversely cut leaves of *Aloe vera*, *Aloe chinensis* and other species. Known in commerce as *Barbados* and *Curacua Aloes.*

Characters.—In yellowish or reddish-brown or almost black hard masses. Fracture either dull and waxy, with opaque splinters; or smooth and glassy, with transparent splinters. Odor disagreeable. Taste nauseous and bitter. *Solubility.*—Almost entirely in alcohol 45 p.c. and 75 p.c. in cold water. *Impurities.*—Natal aloes.

Identification.—The general appearance, color and *odor* help recognition, especially the last, which is characteristic, and can be distinctly perceived when the *drug is breathed upon.* It may be mistaken for *Guaiacum resin* which has a greenish tint and no smell; and *Jalap resin* which has a sweetish odor and acrid taste.

Composition.—(1) *Aloin* (Barbaloin). (2) *Resin.* (3) *Volatile oil.* (4) *Gallic acid* a trace.

Action.—A simple purgative. **B.P. Dose.**—2 to 5 grs.

Enters into.—Pil. Cambog. Co., Pil. Colocynth. Co., Pil. Colocynth. et Hyoscyam., and the preparation of Aloinum and the

OFFICIAL PREPARATIONS.

1. **Decoctum Aloes Compositum.—B.P. Dose.**—½ to 2 ozs.
2. **Extractum Aloes Barbadensis.—B.P. Dose.**—1 to 4 grs.
3. **Pilula Aloes Barbadensis.—B.P. Dose.**—4 to 8 grs.
4. **Pilula Aloes et Ferri.—B.P. Dose.**—4 to 8 grs.
5. **Tinctura Aloes.—B.P. Dose.**—½ to 1 dr. for repeated use, and 1½ to 2 drs. for a single dose.

ALOE SOCOTRINA. Socotrine Aloes. N.O. *Liliaceæ.*

Habitat.—Socotra and Zanzibar shipped *via* Bombay.

Source.—Dried juice from the transversely cut leaves of *Aloe Perryi* and probably other species of Aloes. Both the Socotrine and Zanzibar aloes are official.

Characters.—*Socotrine Aloes.*—Viscid, brownish-yellow, or dark-brown or nearly black, hard masses when dry. Fracture dull waxy, uneven. Odor strong, not disagreeable. Taste nauseous, bitter. *Zanzibar Aloes.*—In liver-brown masses; fracture dull, waxy, nearly smooth, even; odor characteristic; taste nauseous, bitter. Both varieties are opaque even in small splinters. *Solubility of both varieties.*—Almost entirely in alcohol 45 p. c. and 1 in 2 of water. *Impurities.*—Barbados and Natal aloes.

Identification.—It is recognised as aloes by the general characters. From Barbados aloes it is made out by its *fruity and agreeable odor.* The color of the powder of the two varieties also differs materially. The distinction between guaiacum and jalap resins has been adverted to.

Composition.—The same as that of Barbados aloes.

Action.—A simple purgative. **B.P. Dose.**—2 to 5 grs.

Enters into.—Pil. Rhei Co., Tr. Benzoin. Co. and the preparation of Aloinum and the

OFFICIAL PREPARATIONS.

1. **Pilula Aloes Socotrinæ.**—**B.P. Dose.**—4 to 8 grs.
2. **Pilula Aloes et Asafetida.**—**B.P. Dose.**—4 to 8 grs.
3. **Pilula Aloes et Myrrhæ.**—**B.P. Dose.**—4 to 8 grs.

NON-OFFICIAL PREPARATIONS.

1. **Extractum Aloes Socotrinæ, B.P. 1885.**—*Dose.*—1 to 6 grs.
2. **Tinctura Aloes Co.** *Syn.*—*Elixir ad longam vitam.*

ALOINUM. Aloin. $C_{16}H_{16}O_7, 3H_2O$.

Source.—A crystalline neutral principle extracted from Barbados and Socotrine aloes. The formula given above is that of Aloin extracted from Barbados aloes.

Aloin is named according to the variety of aloes from which it is extracted, as **Barbaloin, Socoaloin, Nataloin, &c.**

Characters.—Tufts of yellow acicular crystals; inodorous; taste of the aloes. *Solubility.*—Freely in hot water, nearly insoluble in cold.

Action.—Cathartic. **B.P. Dose.**—½ to 2 grs. in pill.

NON-OFFICIAL PREPARATION.

1. **Pilula Aloini Co.**—Aloin, Ext. Nucis Vom., Ferri Sulph., Myrrh., Soap, each gr. ½. Given half an hour before the last meal.

PHARMACOLOGY.

Externally.—The activity of aloes is due to its active principle aloin. On the unbroken skin it has no action, but is absorbed from a denuded surface which it stimulates. If sprinkled over an ulcer, it causes purging.

Internally. **Gastro-intestinal canal.**—In minute doses, aloes acts on the stomach as a **stomachic, bitter tonic.** Its action is not so marked on the small intestine, beyond slightly increasing the flow of bile, but it powerfully stimulates the muscular fibres of the colon, and slightly increases its glandular secretion. Therefore, it is a **cathartic,** but its action is slow, taking 10 to 20 hours to purge. Large doses do not necessarily act earlier, but operate more violently accompanied with pain, griping, tenesmus and even bleeding from the rectum. In moderate doses, the stools are soft, dark-coloured and formed, and in large doses they are liquid. The slowness of its action is believed to be due to the fact that aloin cannot produce catharsis unless it is decomposed in the intestine into a more potent product by admixture with bile. Soap or alkalis combined with it helps its solution, and to a certain extent prevents griping. The griping is caused by the irregular contractions of the colon. It increases the vascularity of the rectum, therefore the constant use of aloes may cause hæmorrhoids. When given as an enema, it kills thread worms.

Liver.—According to Röhrig and Rutherford, aloes increases the secretion of bile and is therefore a direct **hepatic stimulant.**

Uterus.—By stimulating the pelvic circulation, aloes acts as an **emmenagogue** (see p. 165). Sometimes it leads to menorrhagia. The writer once treated a case of violent menorrhagia caused by the habitual use of aloes. It may cause abortion.

Male genital organs.—It may act as an **aphrodisiac** by reflex stimulation, due to the irritation of the pelvic organs.

Elimination.—Aloes is excreted mostly by milk, for suckling babies are purged when it is given to their mothers. It is also slightly thrown off by urine.

Aloin causes less griping. Barbados aloes is slightly stronger than other varieties.

THERAPEUTICS.

Externally.—The Indian bazar aloes (*musabâr*) with turmeric or opium made into a paste is considered by the natives of India as an effective remedy for contusions and swellings, but it remains to be proved how far it is beneficial in this respect.

Internally. **Gastro-intestinal tract.**—Aloes is reckoned as a **valuable purgative** in **chronic** and **habitual constipation**, for (1) it does not cause after-constipation, (2) gains instead of losing its activity by repetition, (3) improves rather than deranges digestion, (4) stimulates the secretion of bile, and (5) improves the tone of the colon. Aloes is ordinarily given in the form of a pill with rhubarb, nux vomica, ipecacuanha or colocynth. Its griping property is corrected by carminatives and extract of belladonna or hyoscyamus In minute doses it relieves piles, and in large doses aggravates them. Compound decoction of aloes is a useful preparation for the constipation of children with hard fæces. worms and derangement of digestion, but is unreliable at times. According to Whitla, it may be used to check obstinate **diarrhœa** in adults and children. An enema of aloes may be used as an **anthelmintic.**

Female diseases.—Aloes is given with success in **amenorrhœa** and delayed menstruation, especially when associated with dyspepsia and chronic constipation. For this purpose we use Pil. Aloes et Myrrhæ. When given with iron as Pil. Aloes et Ferri, it is very serviceable in **anæmia, chlorosis** and **amenorrhœa** of young girls.

Caution.—Aloes is contra-indicated in pregnancy; irritable conditions of the pelvic organs, especially rectum, hæmorrhoids, menorrhagia, and during the nursing period of mothers.

Prescribing hints.—Aloes is ordinarily given in the form of a pill. Aloin gr. 4, Strychnine Sulph gr. ¼, Pulv. Ipecac gr. 6, Ext. Belladonna gr. 1½. M. Divide into 20 pills. One pill daily in habitual constipation after dinner. Extract of liquorice disguises its nauseous taste.

ALSTONIA. Alstonia. N.O. *Apocynaceæ.*

(*Ind. and Col. Addendum.*)

Syn. I.V.—*Sapta parna*, Sans. *Chátim*, Beng. *Chátián*, *Sátni*, Hind.

Habitat.—India, Australasia, Eastern Colonies.

Source.—The dried barks of *Alstonia scholaris* and of *Alstonia constricta.*

Characters.—The *bark of Alstonia scholaris.*—In fragments, ⅛ to ½ in. thick, spongy, brownish-grey outside, bright buff within; no odor; taste bitter. The bark of *Alstonia constricta.*—In curved pieces or quills, 2½ in. wide, ½ in. thick. Periderm thick, rusty-brown, rugose, reticulated. Internally cinnamon-brown with longitudinal striæ. Odor faint-aromatic. Taste very bitter.

Composition.—The bark contains many alkaloids, the chief being *ditain* from the *dita bark* (A. scholaris) and *Alstonine* from the bark of A. constricta.

OFFICIAL PREPARATIONS.

1. **Infusum Alstoniæ.**—1 in 20, ½ hour. **B.P. Dose.**—½ to 1 oz.
2. **Tinctura Alstoniæ.**—Powdered bark 2½ ozs., Alcohol 60 p.c. 1 pint. By maceration. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The milky juice of the plant, or its fresh leaves roasted and made into a poultice, applied to foul ulcers, stimulate them and remove maggots if present.

Internally.—The bark is an **astringent, tonic, antiperiodic** and **anthelmintic**, being considered very useful in chronic **diarrhœa**, advanced stages of **dysentery** and **catarrhal fever. Ditain** paralyses the motor nerve endings in mammals and has been found successful in the treatment of malarial fevers. Dr. Sharp recently used the bark of *A. constricta* in certain conditions of **typhoid fever** and **influenza** after its febrile stage; and considers it to be an excellent **tonic** possessing the combined properties of quinine and strychnine.

ALUMEN. Alum.

Potassium Alum—$Al_2(SO_4)_3$, K_2SO_4, $24H_2O$.

Ammonium Alum—$Al_2(SO_4)_3$, $(NH_4)_2SO_4$, $24H_2O$.

Syn. I.V.—*Fatkiri*, Beng. *Fitkári*, Hind.

Source.—Prepared by combining aluminium sulphate with potassium sulphate or with ammonium sulphate.

Characters.—Colorless, transparent, regular, octohedral crystals. Taste sweetish, astringent. *Solubility.*—1 in 10 of cold and 1 in 3 of boiling water, freely in glycerin, insoluble in alcohol 90. p.c. *Impurities.*—Silicates and iron sulphate.

Identification.—Crystals of alum are made out by their characteristic shape, exhibiting *faces of octohedron.* The peculiar sweetish astringent taste will identify its powder.

Incompatibles.—Lime, alkalis, salts of lead, mercury and iron, tartaric acid, tartrates, tannic acid.

Action.—Astringent, emetic. **B.P. Dose.**—5 to 10 grs.

OFFICIAL PREPARATION.

1. **Glycerinum Aluminis.**—1 in 6. By trituration and gentle heat if necessary. A local astringent.

ALUMEN EXSICCATUM. Exsiccated Alum.

Source.—Prepared by heating potassium alum till aqueous vapor ceases to be disengaged, and the salt loses 45 to 46 p.c. of its weight.

Characters.—A white soluble powder absorbing moisture on exposure to air.

NON-OFFICIAL PREPARATIONS AND ALLIED DERIVATIVES.

1. **Lapis Divinus.** *Syn.—Blue Wound-Stone.*—Alum, Copper Sulph., Potassium Nitrate, of each 1 oz. Fuse, and when molten, add Camphor 1 dr. Mix and cast into sticks.

2. **Lapis Miraculosus.** *Syn.—Yellow Wound-Stone.*—Alum 16, Ferri Sulph. 24, Copper Sulph. 16, Ammon. Chlorid. 1, Verdigris 2. Mix and fuse.

3. **Liq. Aluminii Acetici. G.P.**—7½ to 8 p.c. of aluminium subacetate. An antiseptic mouth lotion (1 in 3). **Aluminium Aceto-Tartrate** is a better preparation for making lotions.

4. **Aluminii Chloridum.**—A white amorphous deliquescent powder. Relieves the pain of locomotor ataxy. *Dose.*—2 to 4 grs. Its solution (impure) is known as **Chloralum**, a disinfectant.

5. **Alumnol.** *Syn.—Aluminium salt of naphthol-sulphonic acid.*—A whitish soluble powder. A ½ to 2 p.c. lotion is useful in ozœna, pharyngitis, gonorrhœa, leucorrhœa. A 20 p.c. solution is caustic.

6. **Sozal.** *Syn.—Aluminium salt of para-phenol-sulphonic acid.*—In pale reddish-brown soluble masses. An antiseptic for making lotions.

7. **Salumin.**—See page 196. 8. **Gallal.**—See Acid. Gallic. 9. **Tannal.**—See Acid. Tannic. 10. **Ferri Aluminas.**—See Ferrum.

PHARMACOLOGY.

Externally.—Alum has no action on the unbroken skin, but coagulates the albumen of discharges and tissues. It therefore forms a covering on ulcers and sores, and constringes blood-vessels and arrests bleeding. Hence it is a valuable **local astringent** and **hæmostatic**. The dried alum is a mild **caustic** because it abstracts water.

Internally. **Mouth and throat.**—Alum is a local **astringent** to the mouth and throat, imparting an astringent taste, and a feeling of dryness to the throat.

Stomach and intestine.—In small doses (4 to 8 grs.), it has the same astringent action on the stomach and intestine as on the raw skin, producing **constipation**. Its **hæmostatic action** is now believed to be entirely local, having little effect on remote hæmorrhages. In 30 to 60 grs. it causes **vomiting** by directly stimulating the peripheral nerves of the stomach, and in still larger doses, it is a **gastro-intestinal irritant** causing vomiting and purging. When injected *per rectum*, it kills **thread worms.**

Elimination.—Alum is probably absorbed into the blood as an albuminate, and has no remote action on the tissues in medicinal doses. It is chiefly thrown out with the fæces and partly by the skin and kidneys.

Acute toxic action.—Poisoning by alum is rare. When it occurs, the symptoms are those of gastro-intestinal irritation—vomiting, purging, &c.

Antidotes.—Emetics or pump. Small doses of sodium carbonate in tepid water decompose alum.

Chronic toxic action.—Anorexia, constipation, gastro-intestinal catarrh are the prominent symptoms.

THERAPEUTICS.

Externally. **Skin.**—Being cheap and easily available, alum is used in various minor complaints. In powder or in a concentrated solution, it stops bleeding from **leech bites, wounds,** and **superficial cuts.** Exsiccated alum destroys weak exuberant **granulations.** A weak solution of alum and borax (1 p.c. of each) checks the discharge of **weeping eczema**

Nose.— Its solution makes a useful **collunarium in ozœna.** Powdered alum either sniffed up or blown in by means of a paper funnel, or its lotion (10 grs. in 1 oz.) injected into the nostrils, arrests **epistaxis.**

Eyes.—Alum makes a useful **collyrium** (4 to 8 grs. in 1 oz.) for ordinary or purulent **conjunctivitis,** but it must be used with caution, as it may cause perforation by dissolving the corneal cement. But the writer has never seen a single case of corneal perforation from such an application.

Genitals.—It makes a capital wash (1 dr. in 1 pint) for

vulvitis of children, if the parts are frequently irrigated and a piece of lint soaked in the lotion is left between them. It also relieves **pruritus.** A douche (10 grs. to 1 oz.) removes **leucorrhœa,** checks slight **hæmorrhage** from **patulous os** after abortion or delivery, and benefits **prolapsed uterus.** A weak solution (3 grs. in 1 oz.) is successfully employed in **gonorrhœa** as an injection.

Rectum.—A daily wash with a solution of alum (6 grs. in 1 oz.) after each defæcation benefits **prolapse of the rectum and hæmorrhoids.**

Internally. **Mouth.**—Alum is commonly used as a dentifrice in **ulcerated and spongy gums.** A solution (5 to 10 grs. in 1 oz) is a useful gargle in **sore throat, elongated uvula, tonsillitis, salivation** and **apthous** and **ulcerative stomatitis,** but Glyc. Aluminis is a better application in these cases. Occasionally dried alum is dusted over as a solvent for **diphtheritic** and **crupous false membranes.** In the form of a spray, alum may be employed in **hoarseness** and **chronic coughs.**

Stomach and intestine.—Alum is considered to be an efficient non-depressant **emetic** in **croup** and **bronchitis.** Meigs uses 1 dr. of alum with honey or syrup every 10 or 15 minutes till the child vomits. By lessening the congestion of the stomach caused by constant coughing, it is said to control the **vomiting of phthisis** and **pertussis.** As an astringent, it is used in **chronic diarrhœa** and **dysentery,** and as a local hæmostatic in **gastro-intestinal hæmorrhage.** Alum-whey obtained by curdling 1 pint of milk with 2 drs. of alum may be given in enteric and other **diarrhœa** with benefit. In 30 gr. doses frequently repeated, it relieves **lead colic** by opening the bowels and precipitating lead salts as insoluble lead sulphates.

Lungs.—Alum is one of the vaunted remedies for **whooping cough.** It is said that 10 grs. of powdered alum placed dry on the tongue, sometimes checks a fit of **asthma.**

AMMONIACUM. Ammoniacum. N.O. *Umbelliferæ*.

Habitat.—Persia, the Punjab.

Source.—A gum-resin exuded from the flowering and fruiting stems of *Dorema ammoniacum*, and probably other species.

Characters.—In pale yellowish or brownish tears, or in nodular masses; ¼ to 1 in. in diameter; hard, brittle when cold, having a waxy lustre in freshly-fractured surface; soft when warmed. Internally opaque from milk white to brownish-yellow. Odor faint, characteristic, but not alliaceous. Taste bitter, acrid. Forms a white emulsion with water.

Identification.—It resembles *galbanum*, *benzoin* and *asafetida*, from which it can be distinguished by its odor, and the following test:—If a small fragment be heated to redness in a dry test-tube, the contents of the tube, after cooling, yield with boiling water a solution which when largely diluted with water and made alkaline with ammonia solution, does not exhibit a blue fluorescence (distinction from asafetida and galbanum).

Composition.—(1) *Gum* 20 p.c. (2) *Resin* 70 p.c. (3) *Volatile oil* 4 p.c.

Action.—Stimulant expectorant. **B.P. Dose.**—5 to 15 grs.

Enters into.—Pil Ipecac. c. Scillæ, Pil. Scillæ Co. and the

OFFICIAL PREPARATIONS.

1. **Emplastrum Ammoniaci cum Hydrargyro.**—12 in 15.
2. **Mistura Ammoniaci.**—13½ grs. in 1 oz. A milk-like emulsion. **B.P. Dose.**—½ to 1 oz.

PHARMACOLOGY.

Externally.—Applied locally, ammoniacum gently stimulates the blood-vessels and nerves of the part, thereby promoting the absorption of morbid products. It is therefore a **resolvent.** This action is greatly augmented when it is combined with mercury, as the B. P. ammoniacum and mercury plaster, which, if kept long, gives rise to a sort of rash.

Internally.—Like oleo-resins and aromatics, it is excreted by the bronchial glands, stimulating and disinfecting their secretion. Hence it is a **remote stimulating disinfectant expectorant.** In large doses it is a laxative.

THERAPEUTICS.

Externally.—As a *resolvent* its plaster is employed in **sympathetic buboes, enlarged and indolent glands,** and **chronic inflammatory joint diseases,** such as synovitis, rheumatic swellings, &c.

Internally.—Ammoniacum is a valuable remedy for **chronic bronchitis** of the old and emphysematous. In 10 to 30 gr. doses three or four times a day, it loosens adhesive mucus, checks wheezing and facilitates expectoration.

AMMONII BENZOAS. See Benzoinum.

AMMONIUM BROMIDUM. See Bromum.

AMMONIA. Ammonia.

Source.—Ammonia is chiefly obtained from the liquor of the gas-works, and from iron-smelting furnace and paraffin shale, and purified.

AMMONIÆ LIQUOR FORTIS.

Strong solution of Ammonia. NH_3.

Source.—An aqueous solution obtained by heating a mixture of ammonium chloride and slaked lime, and passing the gas (ammonia) into distilled water. Contains 32½ p.c. of NH_3 by weight.

Characters.—A colorless, alkaline liquid ; odor characteristic, very pungent. Sp. gr. 0·891. *Impurities.*—Choride, sulphide, and sulphate of ammonia, lime metals.

Identification.—The characteristic odor helps diagnosis.

Action.—Vesicant.

Enters into.—Lint. Hydrarg., Tr. Guaiac. Ammon., and in the preparation of Ammon. Benz., Ammon. Brom., Ammon. Phosph., and the

OFFICIAL PREPARATIONS.

1. **Liquor Ammoniæ.**—10 p.c. by weight. *Enters into.*—Tr. Ergot. Ammon., Tr. Opii. Ammon., Tr. Quin. Ammon., Tr. Valer. Ammon. and—

(*a*). **Linimentum Ammoniæ.** *Syn.—Hartshorn Liniment.*—1 in 4. Ammonia soap is formed by the mixture.

2. **Linimentum Camphoræ Ammoniatum.**—1 in 20.
3. **Spiritus Ammoniæ Aromaticus.**—See Ammon. Carb.
4. **Spiritus Ammoniæ Fetidus.**—1 in 10. **B.P. Dose.**—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.

NON-OFFICIAL PREPARATIONS.

1. **Lotio Crinalis.**—Ol. Amygdal. 1, Liq. Ammon. Fort 1, Sp. Rosmar. 4, Aq. Mellis 2. Mix.
2. **Tr. Ammon. Comp.** *Syn.—Eau de Luce.*—Mastic 2 drs., Alcohol 90 p.c. 9 drs., Ol. Lavand. 14 ms., Liq. Ammon Fort. 20 ozs. Dissolve. A local application to snake-bite.

PHARMACOLOGY.

Externally.—A solution of ammonia when rubbed in or applied to the skin stimulates peripheral nerves and superficial blood-vessels, producing a sensation of heat and redness. If it is concentrated and its evaporation confined, it blisters. Ammonia is therefore a **rubefacient** and **vesicant.**

Nose and air-passages.—The vapor of ammonia powerfully **irritates** the mucous membrane of the nose and air-passages causing sneezing. It also irritates the conjunctiva producing watering from the eyes. By exciting the nasal afferent nerves, it **reflexly stimulates circulation,** and accelerates pulse-beat. If the inhalation is prolonged or the vapor is too concentrated, inflammation of the nasal and air-passages results.

Internally.—Reaching the stomach, ammonia at once **reflexly stimulates the heart and circulation** by its action on the accelerator centre. After absorption this action is continued and **respiration is accelerated.** Like other alkalis it neutralises the acidity of the gastric juice if given after food and increases its flow if given before. It also increases peristalsis and causes a sense of warmth in the stomach. Therefore, it is an **antacid, gastric stimulant** and **carminative.** In large doses, it is a **gastro-intestinal irritant.**

Blood.—Ammonia slightly increases the alkalinity of the plasma, and is supposed to reduce the coagulation of the blood, and to dissolve any clot if formed.

Heart.—Its action is stimulated reflexly as well as after absorption by the excitement of the accelerator centre.

Lungs.—Respiration is increased by the direct stimulation of the **respiratory centre** after absorption. Ammonia is partly eliminated by the bronchial glands, whose secretion it increases. Rossback found that after applying a weak solution to the mucous membrane of the trachea of a living animal, there was a decided congestion of the surface with increased mucous discharge.

Nervous system.—Ammonia is a **general stimulant**, because it stimulates the respiratory and accelerator centres. It has no action on the brain. It acts on the nerves when locally applied, causing tingling and burning. In toxic doses, it produces convulsions owing to the stimulation of the motor cells in the cord.

Kidneys.—Ammonia and its salts are decomposed in the blood and tissues, partly so at least in the liver by carbonic acid, generating uric acid, urea, and nitric acid. Therefore (N. B.) ammonia **increases the acidity of urine**, with increased excretion of urea, uric acid, &c.

Elimination.—Ammonia is thrown off with the breath, sweat, urine and bronchial secretion.

Toxic action.—If a large concentrated solution is swallowed, it may cause death within a few minutes from suffocation from the entrance of vapor into the wind-pipe. Otherwise, the symptoms are those of poisoning by alkalis, but more corrosive.

Antidotes.—The same as those of the alkalis.

THERAPEUTICS.

Externally.—As a *local stimulant* to nerves and blood-vessels, the liniment of ammonia is rubbed in **stiff joints**, and in various conditions of **chronic rheumatism** ; and as a *counter-irritant* on the chest in **bronchitis, pneumonia** and **pleurisy.** Ammonia may be used as a *vesicant* in cases where cantharides is contra-indicated. A piece of lint cut slightly larger than the intended blister is moistened with the strong solution and applied, and immediately covered over with a watch glass. Ammonia neutralises the poison of **nettles** and **insect-bites** and thereby lessens the pain and swelling caused by them. A hypodermic injection of or the painting of compound tincture of ammonia has been found efficacious in the **bites of less poisonous snakes.** Lotio Crinalis is an excellent application for the growth of hair.

The vapor (smelling salts) is used to rouse patients from fainting, shock, syncope, and stupor and narcotic poisoning.

Internally.—Like other alkalis ammonia may be given in **acid dyspepsia.** Spirit of sal volatile is a useful remedy for **gastric**

and intestinal cramps; a few drops with soda and dill water giving relief to **flatulence** in infants. As a general diffusible stimulant, ammonia is extremely serviceable in **syncope, shock, fainting,** and in the low adynamic conditions of **febrile diseases, pneumonia, phthisis,** &c. It makes an excellent "pick-me-up" for extra alcoholic indulgence. It softens the phlegm in bronchitis and catarrhal pneumonia, but the carbonate does this better. Ammonia controls *iodism*, and is therefore combined with iodides, when prescribed in large doses.

AMMONII CARBONAS. Ammonium Carbonate.

Syn.—Ammonium Sesquicarbonate.

Source.—A variable mixture of ammonium hydrogen carbonate NH_4HCO_3 with ammonium carbamate $NH_4NH_2CO_2$, obtained by subliming ammonium sulphate or chloride with calcium carbonate; thus $2CaCO_3 + 4NH_4Cl = N_3H_{11}C_2O_5 + 2CaCl_2 + H_2O + NH_3$.

Characters.—In volatile, translucent, crystalline masses; odor ammoniacal; reaction alkaline. Effloresces when exposed to air. *Solubility.*—1 in 4 of cold water. *Impurities.*—Sulphates and chlorides.

Identification.—The odor and the translucent appearance, particularly when freshly broken, help recognition. A white powdery coating forms on samples exposed to air.

Incompatibles.—Acids, acid salts, lime water, iron salts, alkaline earths and alkaloids.

Dispensing hints.—This powdery coating should be scraped off before dispensing,

Action.—Antacid, stimulant, expectorant, emetic. **B.P. Dose.**—3 to 10 grs. as a stimulant and expectorant; 30 grs. as an emetic.

Enters into.—The preparation of Ammon. Chloride, Bism. Carb., Ferri Carb. Sacch., and the

Official Preparations.

1. **Liquor Ammonii Acetatis.** *Syn.—Spirit of Mindererus.*—Stimulant, diuretic, diaphoretic. Should be *neutral* or slightly acid. Stock in green bottles. **B.P. Dose.**—2 to 6 drs.
2. **Liquor Ammonii Citratis.**—About 16 p.c. Diuretic, diaphoretic. Stock in green bottles. **B.P. Dose.**—2 to 6 drs.
3. **Spiritus Ammoniæ Aromaticus.** *Syn.—Spt. Ammon. Com. Spirit of Sal Volatile.*—Cardiac stimulant. **B.P. Dose.**—20 to 40 ms. for repeated use, 60 to 90 ms. for a single dose. Should not be prescribed with Syrupus Scillæ.

Non-Official Preparations and Derivatives.

1. **Liq. Ammon. Acet. Fort., B.P. 1885.**—1 with 5 of distilled water forms the official diluted Liq. Ammon. Acet. *Dose.*—25 to 75 ms.
2. **Liq. Ammon. Citratis Fort., B.P. 1885.**—1 to 3 of distilled water forms the official Liq. Ammon. Citratis. *Dose.*—½ to 1½ drs.
3. **Ammonii Bicarbonas.**—More palatable and less caustic. Suitable for effervescing draughts. *Dose.*—3 to 10 grs.

4. **Ammonii Fluoridum.**—In enlarged spleen. *Dose.*—5 to 20 ms. of the solution (4 grs. in 1 oz.).

5. **Ammonii Picras.**—In yellow scales soluble in water. In ague and malarial fevers. *Dose.*—⅛ to 1½ grs. 4 or 5 times daily.

6. **Ammonii Tartras.**—Expectorant. *Dose.*—5 to 30 grs.

7. **Smelling Salts.**—There are several kinds. The following is a sample of **inexhaustible salts** :—Ammon. Chloride 1½ ozs., Pot. Carb. 1 oz. 6 drs., Camphor 1 dr., Ammon. Carb. 3 drs., Oil of Cloves 10 ms., Oil of Bergamot 10 ms., Oil of Spearmint 4 ms. Powder the solids and mix the oils.

8. **Pick-me-up.**—Spt. Ammon. Arom. ½ dr., Spt. Chlorof. ½ dr., Tr. Gentian Co. 1 dr., Tr. Card. Co. 2 drs., Syrupi 2 drs., Aq. ad. 2 ozs. M. for a dose.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Ammonium Carbonate is never used externally though it has the same actions as those of Liqr. Ammonia. Spirit Ammon. Aromat. is inhaled for reflex stimulation.

Internally.—The carbonate possesses all the virtues of the Liquor, and in addition is a **powerfully stimulating expectorant**, facilitating the expulsion of viscid mucus. It is therefore very useful in **bronchitis**, and **catarrhal pneumonia**. It is an **emetic** in ½ dr. doses, though rarely used.

In large doses (20 to 30 grs.), it acts also as a **purgative**. Sometimes, even in small repeated doses when continued long, it **irritates the bowels**. The carbonate should not therefore be given in cases complicated with **diarrhœa**.

The solutions of acetate and citrate are **diaphoretics**, acting possibly either on the secreting cells or on the periphery of the secreting nerves of the sweat-glands (see p. 149), but the acetate appears to be more powerful. If the patient is kept cool, their action concentrates upon the kidneys and produces diuresis. For these actions, they are used as mild, non-depressant **antipyretics in fevers**. They are also given to counteract the effects of immoderate alcoholic drinking.

Prescribing hints.—The carbonate is best given well diluted in milk, or syrup and water. Liqr. Ammon. Acetat. 2 ozs., Pot. Acetat. 2 drs., Spt. Æther Nitrosi 4 drs., Syrup and water to 8 ozs. make a good non-depressant **diaphoretic mixture**, which may be used in any **febrile disease**. Liqr. Ammon. Acetat. 2 ozs., Ammon. Carb. 40 grs., Pot. Iodide 16 grs., Vin. Antim. 40 ms., Syrup and water to 8 ozs. make a capital mixture for **catarrhal pneumonia**.

AMMONII CHLORIDUM. Ammonium Chloride. NH_4Cl.

Syn.—Sal Ammoniac. **Syn. I.V.**—*Nishedal*, Beng. *Noshádar*, Hind.

Source.—Prepared by neutralising crude solution of ammonia or ammonium carbonate with hydrochloric acid. Thus $NH_4HO + HCl = NH_4Cl + H_2O$.

In India this is manufactured from a peculiar clay found at Karnal in the Punjab and is easily obtainable in the bazars.

Characters.—In colorless, inodorous crystals. *Solubility.*—1 in 3 of cold water, 1 in 60 of alcohol 90 p.c. *Impurities.*—Iron, lead, and tarry matters.

Identification.—The peculiar fibrous, translucent appearance helps recognition.

Incompatibles.—Alkalis and their carbonates, alkaline earths, lead and silver salts.

Dispensing hints.—It is not easy to powder ammonium chloride and is best done by dissolving the salt in hot water and evaporating the solution to dryness with constant stirring (see p. 11). The powder is granular and cannot be recognised.

Action.—Hepatic stimulant, expectorant. **B.P. Dose.**—5 to 20 grs.

Enters into.—The preparation of Liqr. Ammon. Fort.

NON-OFFICIAL PREPARATIONS.

1. **Lotio Evaporans.**—Ammon. Chloride. ½, Spt. Rect. 2, Water to 12. Dissolve.
2. **Lotio Refrigerans** (Sir A. Cooper).—Ammon. Chlorid. 5, Pot. nitras 5, Water 16. Dissolve.
3. **Troch. Ammon. Chlor.**—2 to 3 grs. in each. In bronchitis.
4. **Vapor. Ammon. Chlor.**—Obtained by mixing hydrochloric acid and ammonia in a suitable apparatus and purifying through water or moist sponge. A useful inhalation in bronchitis.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—A solution of ammonium chloride has a **soothing refrigerant** effect when locally applied, and this is greatly increased by the addition of alcohol and potassium nitrate. Hence, the evaporating and cooling lotions are useful in sprains, bruises, fractures, dislocations, headache, cerebral congestion, apoplexy, &c. They may also be applied to threatening mammary abscess and glandular inflammations. In the form of an inhalation, ammonium chloride increases the secretion of mucus from the pharynx, larynx, trachea, bronchi and Eustachian tubes, and is therefore serviceable in chronic **pharyngitis, laryngitis, bronchitis** and **otitis media.**

Internally. **Gastro-intestinal canal.**—Ammonium chloride when allowed to melt slowly in the mouth acts as a **reflex expectorant.** In moderate doses 10 to 15 grs., it is a **gastro-intestinal stimulant** particularly to the intestine. It is an excellent remedy for **gastric catarrh.** It is said to relieve the vomiting and heart-burn due to cancer in the stomach.

Liver.—It stimulates the secretion of **bile** (see p. 132) and is used in **catarrhal jaundice,** subacute and chronic **congestion, enlargement** and **threatening abscess** of the liver.

Lungs.—It is a stimulating **expectorant** whether given internally or by inhalation, and is serviceable in **bronchial catarrh**

without fever. 10 grs. dissolved in about 3 ozs. of cold water, sipped frequently, relieves the distressing fits of coughing in bronchitis.

Nervous system.—It is not a cerebral stimulant. In 30 gr. doses it sometimes relieves **migraine, clavus hystericus, myalgia, sciatica** and **intercostal** and **hepatic neuralgia.** As an alterative it is sometimes given in **gout** and **rheumatism.**

Kidneys.—It has a feeble **diuretic** property, and is given in **dropsy** caused by hepatic disorders.

Prescribing hints.—It may be given in powder, compressed tablets, lozenges or in a mixture. Its taste is disguised by chloroform and syrup or extract of liquorice. (See p. 117.) In the absence of an inhaler, the vapor produced by simply heating ammonium chloride on a dish may be inhaled.

AMMONII PHOSPHAS. Ammonium Phosphate.

$(NH_4)_2HPO_4$.

Source.—Obtained by neutralising solution of ammcnia with phosphoric acid ; thus $2NH_4OH + H_3PO_4 = (NH_4)_2HPO_4 + 2H_2O$.

Characters.—Transparent, colorless prisms. *Solubility.*—1 in 4 of water, insoluble in alcohol 90 p.c.

Action.—Direct cholagogue, diuretic. **B.P. Dose.**—5 to 20 grs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is a direct **hepatic stimulant,** and diuretic. It decomposes the insoluble urate of sodium and forms soluble ammonium urate and sodium phosphate ; and is therefore recommended in **gout** and **uric acid diathesis.**

AMYGDALA AMARA. Bitter Almond. N.O. *Rosaceæ.*

Syn. I.V.—*Tikta bádám* Beng., *Korué bádám* Hind.

Source.—The ripe fruit of *Prunus Amygdalas, var. Amara.*

Characters.—Resembles the sweet almond in appearance, but shorter and broader ; taste bitter. Its aqueous emulsion emits the characteristic odor.

Composition.—(1) *Purified fixed oil* (non-poisonous) 50 p.c. (2) *Emulsin* or *synaptase* an albuminoid ferment. (3) *Amygdalin* a crystalline glucoside, which in the presence of water and emulsin is decomposed into *hydrocyanic acid, glucose*, and an *essential oil*—oleum amygdalæ amaræ. The pure essential oil is non-poisonous but an artificial oil—Benzaldehyde prepared from Toluene—is often sold in its stead.

AMYGDALA DULCIS. Sweet Almonds. N.O. *Rosaceæ.*

Source.—The ripe seed of *Prunus Amygdalus, var. Dulcis.* known in commerce as the Jordan almond.

Characters.—About 1 in. long, oblong, compressed, acute at one end, rounded at the other. Testa brown, thin, rough. Cotyledons two, oily, exalbuminous. Its aqueous emulsion does not emit any odor. *Impurity.*—Bitter almond.

Composition.—(1) *Fixed oil*, 50 p.c. (2) *Emulsin* and other albuminous products.

Official Preparations.

1. **Mistura Amygdalæ**.—1 in 8. **B.P. Dose**.—½ to 1 oz.
2. **Pulv. Amygdalæ Compositus**.—8 in 13. *Dose*.—60 to 120 grs.

Non-Official Preparation.

1. **Almond Cosmetic Cream**.—Blanched Almond 1 oz., Rose Water 4 ozs. Make a paste.

OLEUM AMYGDALÆ. Almond oil.

Source.—The oil expressed from the bitter or sweet almond.

Characters.—Pale yellow, nearly inodorous, with a bland nutty taste. Sp. gr. 0·915 to 0·920. *Solubility*.—In ether, chloroform, slightly in alcohol 90 p.c. *Impurities*.—Peach-kernel oil and apricot-kernel oil.

Action.—Emollient, demulcent, laxative. *Dose*.—1 to 4 drs.

Enters into.—Lint. Ammon., Ol. Phosph., Ung. Aquæ Rosæ, and Ung. Cetacei.

Non-Official Preparation.

1. **Lime Juice and Glycerin**.—Almond Oil 3½ drs., Oil of Lemon 1 dr., Lime-water to 8 ozs. Mix by shaking. Glycerin 1 dr. may be added to justify the name. A popular preparation for the hair.

Pharmacology and Therapeutics.

Externally.—A paste of sweet almond is a **demulcent** and **emollient**, and is used as a cosmetic. Indian ladies make a paste with cream of milk. Almond oil being a bland oil makes a good basis for many hair-oils and ointments. It is a soothing application for **chapped hands, excoriations** and **irritable skin diseases**. The Mistura Amygd. Amaræ made in the same way as Mist. Amygdalæ may relieve the itching of the skin.

Internally.—Sweet almond is **nutritive**. Its flour being devoid of starch is given to diabetic patients as a substitute for starchy food, the only objection to its use being its high price. The flour of the Brazil nuts may be used as a cheaper substitute, but is not so palatable. The almond mixture and compound powder are agreeable vehicles for suspending insoluble drugs.

The oil is a mild **purgative** in 2 to 4 dr. doses. An **enema** of 1 to 3 pints of the oil has been found effective in impaction of fæces and obstruction of bowels.

AMYL NITRIS. Amyl Nitrite.

Source.—Obtained by the interaction of amylic alcohol which has been distilled between 262° and 270° F. and nitrous acid.

Consists chiefly of iso-amyl nitrite $C_5H_{11}NO_2$, but contains other nitrites of the homologous series.

Characters.—A yellowish ethereal liquid ; odor fragrant ; reaction faintest acid ; sp. gr. 0·870 to 0·880 ; *very volatile. Solubility.*—In alcohol 90 p.c. and almost insoluble in water. *Impurities.*—Free acid and amyl nitrate.

Identification.—Its fragrant odor resembling that of the *champa plantain* of Bengal or the ripe pineapple helps recognition.

Dispensing hints.—As the drug is *extremely volatile* it should be kept full in hermetically sealed bottles in a cool place. Agitation or heat helps evaporation.

Action.—Arterial dilator and cardiac accelerator. **B.P. Dose.**—2 to 5 ms. for inhalation. ½ to 1 m. by the mouth.

NON-OFFICIAL PREPARATIONS.

1. **Amyl Nitrite Capsules.**—Glass capsules containing 1, 2, 3 or 5 ms., encased in cotton wool and silk. Before use the capsule is broken within a handkerchief and inhaled.
2. **Iso-Butyl Nitrite** may be used as a substitute for amyl nitrite.
3. **Tertiary Amyl Nitrite.** *Syn.—Bertoni's Ether.*—Possesses all the properties of amyl nitrite, but may be taken in larger doses, and does not produce flushing of the face.

PHARMACOLOGY.

Externally.—Amyl Nitrite is a direct local **depressant** to the sensory nerves, but the action is transitory.

Internally. **Blood.**—It enters the blood readily through the lungs and stomach, and circulates as a sodium nitrite. If absorbed in sufficient quantity, it converts the hæmoglobin into methæmoglobin and another body—nitric oxide hæmoglobin—and renders the arterial and venous blood chocolate coloured, and thereby interferes with the oxidising property of the corpuscles. In ordinary doses the effect is slight and the methæmoglobin is soon de-oxidised, but in toxic doses these changes are enough to kill. The inhalation of oxygen soon de-oxidises methæmoglobin.

Heart and blood-vessels.—Within a minute of inhalation, face, head and neck become warm and flushed, carotids and their branches throb, head appears full and tense, and **heart beats rapidly and violently**, soon followed by headache, giddiness, increased respiration and dilatation of pupils. If the dose is large, the **arterioles of the whole body dilate**, caused by the weakening or paralysis of their muscular coats, for the dilatation occurs if the cord is destroyed. Hence the **blood-pressure** and **arterial tension** are **greatly lowered** The **acceleration of the pulse-beat** without any increase of its force is due to the depressed condition of the vagal roots owing to the diminution of the blood-pressure. In toxic doses the heart may stop in diastole from its direct influence on the cardiac muscle.

Lungs.—Respiration is at first quickened by the stimulation of the respiratory centre, but becomes labored and dyspnœac, and finally stops from the central paralysis and asphyxia.

Nervous system.—Most of the nervous symptoms, such as headache, giddiness, throbbing in the head, dilatation of pupils, &c., are due to the dilatation of the arterioles of the brain and cord. In large doses the reflex action is abolished owing to the profound paralysis of the motor centres in the cord. The functions of the sensory and motor nerves are affected a few minutes before death.

Temperature.—Under the influence of amyl nitrite the temperature falls considerably both in health and fever, caused by peripheral vascular dilatation and diminished metabolism.

Urine.—It escapes with the urine as nitrites and nitrates, and is a feeble **diuretic.** It may produce **glycosuria,** possibly by the dilatation of the hepatic blood-vessels.

THERAPEUTICS.

Inhalation.—The profession first learned the use of amyl nitrite in **angina pectoris** from Dr. Brunton who, seeing that it dilates the arterioles, used it in this disease with startling effects. Five drops give speedy relief in a minute, especially if the disease is paroxysmal. It may even afford relief to angina when there is no arterial contraction. In fact, it relieves, though temporarily, any **cardiac pain** when it comes in paroxysms. The pain of **thoracic aneurism** is often allayed by it. The "flushing" or "heat" which many females experience during menopause may be controlled by this drug. It may arrest a fit of **epilepsy** if inhaled just at the perception of aura, and may cut short a fit of **ague** if inhaled at the cold stage. In **migraine** due to the spasm of the blood vessels of the side of the face, as indicated by the paleness of the affected side, inhalation of amyl nitrite gives relief. It has been found useful in **syncope, fainting, suspended animation** as in drowning and hanging, and **chloroform** and **opium poisoning.**

It has been found efficacious in uncomplicated **asthma,** relieving dyspnœa within a short time. It also temporarily affords relief to **cardiac dyspnœa** accompanied by anasarca, caused by dilated and hypertrophied heart. It is useful in **sea-sickness.** It may relieve the pain of **dysmenorrhœa,** relax **uterine spasms** and arrest the fits of **eclampsia.** It has been suggested for employment in **tetanus** and **strychnine poisoning.**

Caution.—It should be used with great caution in sensitive and nervous persons, who are powerfully affected by it. It should not be administered to persons suffering from aortic diseases, or whose arteries are atheromatous, or to those who are emphysematous, plethoric or suffer from chronic bronchitis.

Prescribing hints.—Inhalation is the usual method, though it may be given by the mouth and subcutaneously. The drug may be poured on a handkerchief or a **glass capsule** broken within its folds and inhaled. By the mouth, it is best given diluted with brandy on sugar, or suspended by mucilage in a mixture. The glass capsules keep better in India. Patients may become habituated to its use, so that after a while it has to be inhaled several times before it gives relief.

AMYLUM. Starch. N.O. *Graminaceæ.*

Syn. I.V.—*Shetsár*, Beng.

Source.—Prepared from the grains of common wheat, *Triticum sativum* ; maize, *Zea Mays* ; and rice, *Oryza sativa.*

Characters.—In fine powder or masses, white, inodorous.

Incompatible.—Iodine.

Enters into.—The preparation of Pulv. Tragacanth. Co. and the

Official Preparation.

1. **Glycerinum Amyli.**—1 in 8, or 1 in 10½ by weight. See p. 26.

Pharmacology and Therapeutics.

Externally.—Starch is bland and non-irritating and may be used as a **protective** and **absorbent** in **weeping eczema, excoriated** and **inflamed surfaces**, as slight burns. In the form of a Violet Powder, which is merely perfumed starch, it is used to prevent chafing or excoriation of the skin of infants. Generally it is used as a basis for dusting powders and insufflations. Glyc. Amyli is a good application for **chilblains** and **chapped hands.**

Internally.—It is a food and an **antidote** for **poisoning** by **iodine.** Mucilage of starch (1 in 40) is used for preparing enemas.

ANDROGRAPHIS. Andrographis. N.O. *Acanthaceæ.*

(*Ind. and Col. Addendum.*)

Syn.—Creat. **Syn. I.V.**—*Kálmeg*, Beng. *Kreat*, Hind.

Habitat.—India, Eastern Colonies.

Source.—The dried plant of *Andrographis paniculata.*

Characters.—*Stem.*—1 to 3 ft. high, quadrangular, slightly winged, longitudinally furrowed, color dark green. *Leaves.*—Opposite, shortly petioled, lanceolate, entire ; upper surface dark green, shining ; lower surface granular. They vary in size. *Flowers.*—Calyx, small, hairy, five-cleft ; capsules cylindrical, two-valved. *Root.*—Simple, fusiform, woody. No odor in dried plant. Taste intensely bitter.

Composition.—(1) A non-basic *bitter principle.* (2) *Tannic acid.* (3) *Sodium chloride.*

Official Preparations.

1. **Infusum Andrographis.**—1 in 20. Andrographis cut small 1 oz., distilled boiling water 1 pint. Infuse for 15 minutes. **B.P. Dose.**—½ to 1 oz.

2. **Liquor Andrographidis Concentratus.**—1 in $\frac{2}{5}$. Andrographis 10 ozs., Alcohol 20 p.c. 25 ozs. By percolation to 1 pint. **B.P. Dose.**—$\frac{1}{2}$ to 1 dr.

3. **Tinctura Andrographidis.**—1 in 10. Andrographis 2 ozs., Alcohol 60 p.c. *q. s.* By percolation to 1 pint. **B.P. Dose.**—$\frac{1}{2}$ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Tr. Andrographidis Co., I.P.**—Andrographis cut small 6 ozs., Myrrh 1 oz., Aloes 1 oz., Proof Spirit *q.s.* to 40 ozs. Macerate for 7 days. Useful in constipation and torpidity of the liver.

2. **Pilula Andrographidis Co.** (*Alui*).—Caraway fruits, *ráduni* (*Ptychotis involucrata*), anise, cloves, and pericarps of greater cardamoms, of each equal parts. Make a pill-mass with the *juice* of Andrographis and divide into pills of the size of a pea. An Indian domestic remedy administered with human milk in infantile diseases.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Andrographis is a **bitter, stomachic, tonic, anthelmintic** and **febrifuge**, generally employed in children's ailments; such as flatulency, diarrhœa, dysentery, loss of appetite, &c.

Drs. Carter, Dymock and Arjun reported on the drug being a bitter tonic and stomachic, useful in general debility, convalescence after fevers and advanced stages of dysentery. As a tonic, stimulant and gentle aperient they consider it useful in dyspepsia and torpidity of the alimentary canal.

In short creat possesses the properties almost similar to those of quassia.

ANETHI FRUCTUS. Dill Fruit. N.O. *Umbelliferæ.*

Syn. I. V.—*Soyá* or *sowá*, Hind.

Habitat.—Middle and Southern Europe and Tropical India.

Source.—The dried ripe fruit of *Peucedanum graveolens.*

Characters.—The fruit consists of two mericarps freed from pedicel. Each is broadly oval; $\frac{1}{6}$ in. long and $\frac{1}{12}$ in. broad; compressed dorsally; brown; dorsal ridges inconspicuous, but lateral ones prolonged into *wings.* Each mericarp exhibits 6 vittæ. Odor and taste aromatic.

Identification.—It resembles *Anise*, *Fennel*, *Caraway* and *Conium*, from which it is made out by the wings of the dill.

Composition.—The *Volatile oil*, official (*q.v.*).

Action.—Carminative.

OFFICIAL PREPARATION.

1. **Aqua Anethi.**—*Dose.*—$\frac{1}{2}$ to 2 ozs. 1 to 2 drs. for a child 1 year old.

OLEUM ANETHI. Oil of Dill.

Source.—Obtained by distilling dill fruit.

Characters.—Color pale-yellow; odor that of the fruit; taste sweet, aromatic ; sp. gr. 0·905 to 0·920. *Solubility.*—In alcohol and ether. **B.P. Dose.**—½ to 3 ms.

Composition.—(1) A *Terpene* (limonene). (2) *Carvol.*

PHARMACOLOGY AND THERAPEUTICS.

The oil of dill fruit is an **aromatic, stimulant, antiseptic** and **carminative**, and is used to relieve **flatulency** and **intestinal colic.** It corrects the griping of purgatives. The Dill Water is chiefly used to remove flatulency in children.

ANISI FRUCTUS. Anise fruit. N.O. *Umbelliferæ.*

Syn. I.V.—*Mouri*, Beng. *Sonf*, Hind. *Anisum*, Bom.

Habitat.—Central and Southern Europe and Northern India.

Source.—The dried ripe fruit of *Pimpinella anisum.*

Characters.—Ovoid, laterally compressed, covered with hairs, greyish-brown, ⅕ in. long, $\frac{1}{12}$ in. broad, odor agreeably aromatic, taste aromatic, sweet. Mericarps remain united and attached to the pedicel ; each mericarp exhibits *many vittæ.*

Composition.—The chief constituent is the official *volatile oil* (*q. v.*).

Identification.—It resembles *Dill*, *Caraway*, *Fennel* and *Conium* from which it can be distinguished by general characters.

OFFICIAL PREPARATION.

1. **Aqua Anisi.**—1 in 10. *Dose.*—½ to 2 ozs.

OLEUM ANISI. Oil of Anise.

Source.—Obtained by distilling anise fruit, or star-anise fruit, *Illicium verum* (N.O. *Magnoliaceæ*).

Characters.—Colorless or pale yellow, odor of the fruit, taste mildly aromatic. Sp. gr. 0·975 to 0·990.

Composition.—(1) *Anethol.* (2) *Anisic aldehyde.* (3) *Methyl-chavicol.*

Action.—Antispasmodic, carminative. **B.P. Dose.**—½ to 3 ms.

Enters into.—Tr. Camph. Co., Tr. Opii Ammon. and the

OFFICIAL PREPARATION.

1. **Spiritus Anisi.**—1 in 10. **B.P. Dose.**—5 to 20 ms.

PHARMACOLOGY AND THERAPEUTICS.

The action and uses of anise are almost identical with those of dill, except that it has a slight **expectorant** property and is often prescribed as a vehicle for cough mixtures.

ANTHEMIDIS FLORES. Chamomile Flowers.

N.O. *Compositeæ.*

Syn. I. V.—*Babuná-ful*, Hind.

Habitat.—Throughout Europe and some parts of India.

Source.—The dried expanded flower-heads of *Anthemis nobilis*, collected from cultivated plants.

Characters.—About ½ to ¾ in. in diameter, hemispherical, white or nearly white. Involucre, composed of several rows of oblong bracts with membranous margins. Receptacle solid, covered with bracts. Florets ligulate, white ; odor aromatic ; taste bitter.

Composition.—(1) *Volatile* oil, official (*q.v.*). (2) *Extractives.*

Action.—Aromatic, stimulant and bitter tonic.

OFFICIAL PREPARATION.

1. **Extractum Anthemidis.**—Contains 15 ms. of oil of chamomile for every 1 lb. **B.P. Dose.**—2 to 8 grs.

OLEUM ANTHEMIDIS. Oil of Chamomile.

Source.—The oil distilled from chamomile flowers.

Characters.—Pale-blue or greenish-blue, becoming yellowish-brown. Odor and taste of the flowers. Sp. gr. 0·905 to 0·915.

Composition.—(1) A *terpene.* (2) *Angelic and tiglic esters* of isobutyl, amyl and hexyl alcohols. (3) *A bitter principle.*

Enters into.—Ext. Anthemid. **B.P. Dose.**—½ to 3 ms.

ACTION AND THERAPEUTICS.

Externally.—A warm infusion, decoction or poultice is a domestic remedy for **sprains** and **inflammations** in their early stages.

Internally.—The flowers are **aromatic, bitter** and **stomachic** and may be given in **atonic dyspepsia.** A large draught of warm infusion acts as an **emetic**, and may be given in **ague** and **biliousness.** The oil is often combined with purgatives to correct their griping properties. The tincture of the German chamomile is praised by Dr. Ringer in summer diarrhœa of children.

ANTIMONIUM NIGRUM PURIFICATUM.

Antimonious Sulphide. Sb_2S_3.

Source.—The native antimonious sulphide purified.

Antimonious tersulphide is found in the Hymalaya mountains and is known as *Surmá* in India.

Characters.—A greyish-black crystalline powder. *Impurities.*—Arsenic and other sulphides.

Enters into.—The preparation of Antim. Sulph.

ANTIMONII OXIDUM. Antimonious Oxide. Sb_4O_6.

Source.—Prepared by pouring solution of antimonious chloride into water, $SbCl_3 + H_2O = SbOCl + 2HCl$., and decomposing the precipitate antimony oxychloride with sodium carbonate, $2SbOCl + Na_2CO_3 = Sb_2O_3 + 2NaCl + CO_2$.

Characters.—A greyish-white powder. *Solubility.*—Readily in HCl, insoluble in water, alcohol and HNO_3. *Impurities.*—Higher oxides.

Action.—Diaphoretic, emetic. **B.P. Dose.**—1 to 2 grs. $\frac{1}{6}$ to $\frac{1}{4}$ gr. for a child 1 year old.

Enters into.—The preparation of Antim. Tart. and the

OFFICIAL PREPARATION.

1. **Pulvis Antimonialis.**—A substitute for *James' Powder.*—1 in 3. **B.P. Dose.**—3 to 6 grs. $\frac{1}{4}$ to $\frac{1}{2}$ gr. for a child 1 year old.

ANTIMONIUM SULPHURATUM.

Sulphurated Antimony.

Source.—A mixture containing antimony sulphides and oxides, Sb_2S_5, Sb_2O_5, Sb_2S_3, Sb_4O_6 and sulphur, prepared by boiling antimonious sulphide with sublimed sulphur and solution of caustic soda and adding diluted sulphuric acid and water.

Characters.—A dull-red powder. *Solubility.*—Insoluble in water.

Action.—Diaphoretic, alterative, emetic. **B.P. Dose.**—1 to 2 grs.

Enters into.—Pil. Hydrag. Subchlorid. Co.

ANTIMONIUM TARTARATUM. Tartarated Antimony.

$[K(SbO)C_4H_4O_6]_2H_2O$.

Syn. B.P.—Potassio-tartrate of Antimony. Tartar Emetic.

Source.—Prepared by setting aside a mixture of antimonious oxide and acid potassium tartrate, made into a paste with a little water, until combination has taken place, and then purifying by crystallisation from water.

Characters.—Colorless, transparent crystals with triangular facets. Taste sweet, metallic. *Solubility.*—1 in 17 of cold, 1 in 3 of boiling water. The solution is acid. *Impurity.*—Acid tartrate of potassium.

Incompatibles.—Alkalis, lead salts, gallic and tannic acids and most astringent substances.

Action.—Diaphoretic, expectorant, cardiac, sedative, emetic. **B.P. Dose.**—Diaphoretic, $\frac{1}{24}$ to $\frac{1}{8}$ gr. ; expectorant, $\frac{1}{8}$ to $\frac{1}{4}$ gr. ; emetic, 1 to 2 grs. ; given in solution or powder. (*Carefully note the doses.*)

OFFICIAL PREPARATION.

1. **Vinum Antimoniale.**—2 grs. to 1 oz. **B.P. Dose.**—10 to 30 ms. 2 to 4 drs. as an emetic. For a child 1 year old 3 ms. as an expectorant, and 15 ms. as an emetic.

PHARMACOLOGY.

Externally.—Salts of antimony cause a characteristic local inflammation, at first papular, then vesicular and lastly pustular, simulating small-pox. This is due to the formation of insoluble irritant precipitates at the orifices of sweat-glands by the acid solution (perspiration). Hence they are **irritants** and **pustulants.**

Internally. **Gastro-intestinal tract.**—The local effects of antimony on the mouth, fauces, œsophagus and stomach are the same as on the skin if it is taken in toxic doses or continued long medicinally. In small doses, it produces a sense of warmth and soreness in the stomach, and in larger doses loss of appetite, nausea and increased secretion of gastro-intestinal mucus. In still larger doses, 1 to 3 grs., it **induces vomiting**, due to (1) the direct stimulation of the gastric nerves reflexly exciting the vomiting centre, and (2) the stimulation of the vomiting centre through the medium of blood, which becomes evident if the drug is injected into the circulation and the stomach is replaced by a bladder. A portion of the drug is **excreted** by the gastro-intestinal mucous membrane, and causes vomiting again by its remote local effect. If given largely diluted with water it causes less vomiting but more purging. In toxic doses it induces **gastro-enteritis**, with symptoms resembling those of cholera.

Heart and Circulation.—Soluble antimonial salts enter the blood readily, but do not appear to combine with the albumen of the plasma. From the beginning, even in small doses, antimony reduces the **force and frequency of the cardiac beat**, which tends to become intermittent, and in large doses the heart gets **profoundly depressed** with the acceleration of the pulse-rate. The **blood pressure falls** considerably (1) partly from the depressed condition of the heart, (2) partly from the relaxed state of the arterioles caused by the depression of some portion of the vaso-motor system, and (3) partly reflexly from the stomach (nausea). Hence, antimony is a **powerful cardiac and circulatory depressant**. (Compare its action with that of aconite on the heart, p. 202.)

Lungs and respiration.—Respiration is very much **depressed** after a brief stimulation. Inspiration becomes short, expiration prolonged, and finally respiratory movements irregular. Antimony is eliminated by the bronchial mucous membrane, and acts as an **antiphlogistic expectorant**.

Temperature is not much affected in health, but is **reduced in fevers**, owing chiefly to (1) the depressed condition of the circulation, (2) diaphoresis, and (3) to some extent, the diminished metabolism.

Liver.—Tartar emetic particularly antimonium sulphuratum directly increases the **secretion of bile**, and is therefore a direct **cholagogue**. It tends also to increase the formation of urea and carbonic acid, and depress the glycogenic function. If continued long, it causes **fatty degeneration**. In these respects its actions resemble those of arsenic and phosphorus (*q. v.*).

Skin.—It is a **powerful diaphoretic**, due chiefly to (*a*) the depressed condition of the circulation, and possibly to some extent, (*b*) the remote local effect on the sweat-glands. Like arsenic it affects the skin of frogs, making the cuticle a soft jelly-like mass which can be scraped off easily. (See p. 175.)

Kidneys.—Tartar emetic in passing through the kidneys may produce a slight **diuretic** effect, depending very much on the action of the skin.

Nervous system.—Tartar emetic is a **powerful sedative** to the nervous system, especially the sensory and motor tracts of the cord, which are affected directly and not through the blood. The cerebrum is also depressed though not so profoundly, causing a feeling of languor, inaptitude for mental exertion, lowness of spirit and sleepiness.

Muscular system.—Both the voluntary and involuntary muscles, especially the former, are **profoundly depressed** and **relaxed**, chiefly by nauseating doses. It is therefore a muscular **antispasmodic**.

Metabolism.—Its effects on metabolism are pretty much the same as those of phosphorus and arsenic (which see). In minute doses it has a slight **alterative** action, but in continued doses, it clings to the tissues tenaciously for some months, producing (*a*) a fatty degeneration of the organs, especially the liver, (*b*) an increased formation of nitrogenous products, and (*c*) a deficient oxidation in the tissues. According to Ringer, antimony is a protoplasmic poison and paralyses the functions of nitrogenous tissues like arsenic, aconite and hydrocyanic acid.

Elimination.—Antimonial salts are excreted by the kidneys, liver, skin, mucous membranes of the bronchi and gastro-intestinal tract and mammary glands. A portion is retained in the body.

Toleration.—Large doses given several times a day sometimes do not induce vomiting, thereby producing tolerance of the drug. This is probably due to the arrest of the acid secretion from its irritant effects (Brunton).

Acute toxic action is very much the same as that of arsenic (see p. 175). The *post-mortem* appearances are not so marked as in arsenical poisoning.

Antidotes.—Emetics or stomach-pump if vomiting is not free. *Tannin is the chief antidote* in any shape. Strong tea, coffee, gallic acid, astringent infusions, and demulcent drinks should be freely given. Stimulants, strychnine and digitalin subcutaneously are also necessary. *Chronic toxic action* is rare now-a-days. For butter of antimony the antidotes are the same as those for mineral acids (see p. 191).

The action of tartar emetic resembles in many respects that of aconite, and the student will no doubt find a ready help to the comparative study of the pharmacology of these two important drugs in the following table :—

	Tartar emetic.	Aconite.
1.	An irritant and pustulant to the skin and mucous membrane.	A sensory depressant and anæsthetic to the same.
2.	An emetic, and purgative in large doses.	A gastro-intestinal irritant in toxic doses.
3.	A powerful cardiac, circulatory and respiratory depressant.	The same.
4.	Lowers blood-pressure.	The same.
5.	An antiphlogistic expectorant.	*Nil.*

	Tartar emetic.	**Aconite.**
6.	A powerful depressant to the cord, and to a less extent to the brain. A muscular relaxant.	A powerful depressant to the sensory nerve-endings. Only large doses cause muscular weakness.
7.	A powerful diaphoretic.	A diaphoretic not so powerful.
8.	An antipyretic.	The same.
9.	A cholagogue, especially antimonium sulphuratum.	*Nil.*
10.	Causes fatty degeneration and is deposited in the tissues.	*Nil.*

THERAPEUTICS.

Externally.—As a *counter-irritant*, tartarated antimony ointment is not used now, though it was largely employed before in diseases of the lungs, meninges and joints.

Internally. **Gastro-intestinal tract.**—As an *emetic*, tartar emetic is not suitable in cases of **poisoning** on account of its tardy action and the general prostration it induces, but is of great service in those cases of acute inflammatory affections of the respiratory tract, such as **croup** and **bronchitis**, where both emesis and vascular depression are needed. **Intermittent fevers** rebellious to quinine yield when it is given after an antimonial emetic.

Circulation and respiration.—As an *antiphlogistic*, tartarated antimony in $\frac{1}{60}$ gr. doses may be given like aconite in a variety of acute inflammatory diseases at the outset, such as **tonsillitis, laryngitis, acute bronchitis, pneumonia, pleurisy, pericarditis, peritonitis, ovaritis, orchitis,** &c. In **acute bronchial affections** of children, antimony still holds a high place when given alone or in combination with ipecacuanha. Half to one tea-spoonful of wine as an emetic, followed by 3 to 5 drops every one or two hours, keeps up expectoration and wards off bronchial spasms.

Fevers.—Tartarated antimony at once cuts short an attack of **catarrhal fever.** As a *diaphoretic* it may sometimes be given to reduce the pyrexia in sthenic subjects. Pulv. Antimonialis Co. is a mild diaphoretic, and may yet occasionally be prescribed in **catarrhal fever** and **broncho-pneumonia** with good results. To check delirium Graves recommends the use of tartar emetic with opium.

Nervous and muscular systems.—Tartarated antimony may be used also to allay the excitement in **mania** and to induce sleep in **acute alcoholism.** Before the introduction of general anæsthetics, it was largely employed as a **relaxant of muscles,** in **dislocations** and **hernia.** Even now, it is occasionally given to relax the **rigidity** of the **os** during parturition.

As an *alterative and cholagogue*, antimonium sulphuratum is often given in **gout** and **hepatic fulness**. With calomel (Plummer's pill) it is given in **syphilis**.

Prescribing hints.—Tartarated antimony is seldom used now. Being a soluble and tasteless salt it is best given in solution. It should be commenced in very small doses, $\frac{1}{60}$ to $\frac{1}{40}$ gr., for it has been found that $\frac{1}{30}$ gr. taken repeatedly causes vomiting. It should never be given as a purgative, and in order to prevent this action it is often combined with opium. Its action on the bronchial mucous membrane is greatly augmented if it is combined with iodides or ipecacuanha.

APOMORPHINÆ HYDROCHLORIDUM. See **Opium.**

AQUA DESTILLATA. Distilled Water. H_2O.

Source.—Prepared by distillation from good potable water.

Characters.—Colorless, tasteless, odorless. Should be free from metals, chlorides, nitrates, nitrites or sulphates.

Used in pharmacy and making up prescriptions.

Pharmacology of Water.

Externally.—The actions of water in different forms and of different temperatures have been fully described under the heads of Baths, Fomentations, Poultices, &c. (see p.p. 61—5, 67, and 69—70).

Boiled or sterilised water is almost free from micro-organisms and is therefore an **antiseptic**. Hot water is also a local **hæmostatic**.

Internally. **Alimentary canal.**—Water is an essential article of food. It allays thirst reflexly as well as by diluting the plasma after absorption. When drunk in moderation and at definite hours, it increases the secretion of saliva, bile, and gastro-intestinal and pancreatic juices. Large quantities derange digestion and cause diarrhœa. Warm water acts as an **emetic** and hot water a **gastric sedative**.

Blood and circulation.—Water is quickly absorbed into the blood. A sudden influx of water into the circulation, if the body has suffered a great loss of the same, may cause death from rapid destruction of corpuscles by osmosis.

Kidneys.—Copious drinking flushes the kidneys and bladder and carries with it effete products circulating in the blood, such as excess of urea, phosphoric and sulphuric acids and sodium chloride, but lessens the amount of uric acid. Thus water is a natural **diuretic**.

Skin.—In hot weather, a glass of water is sufficient to bring on perspiration with many persons, but in cold, warm drinks do this with the aid of external warmth. Water is therefore a powerful **diaphoretic**.

Metabolism.—Water plays an important part in the tissue metamorphosis. Taken under certain precautions, it facilitates construction and destruction of tissues, and thus acts as a true

metabolic stimulant. Hence is the improvement of patients under the water-treatment.

THERAPEUTICS OF WATER.

Externally.—Besides its uses already adverted to in pages 62—5, 67, 69, water, in the form of ice, or constantly changed through a Leiter's coil, is useful in subduing many acute inflammatory diseases, such as **meningitis, cerebritis, synovitis, sprains,** &c. It contracts not only the superficial blood-vessels, but also those of the organs by reflex action. On the same principle, a local application of ice to the surface, arrests internal hæmorrhages, such as **epistaxis, hæmoptysis, hæmatemesis,** &c. A sudden partial application of cold to the abdomen, by flapping a wet towel over it, excites contraction of the parturient womb, and is therefore employed in **uterine inertia** and **post-partum hæmorrhage.** A smart sprinkling of cold water on the face restores consciousness in **hysteria, fainting** and **narcotic** and **chloroform poisoning.** The same plan may be adopted in reviving still born infants. Iced water subcutaneously injected over the diaphragm checks **hiccough,** and within paralysed muscles helps their improvement. Hot water injected into the womb arrests **post-partum hæmorrhage.**

Internally.—Ice sucked allays thirst, vomiting and hiccough. A small glass of cold water slowly sipped controls the craving for **drinks** by stimulating the circulation. In the same manner, hot water before meals soothes the irritable conditions of the stomach in **gastritis, gastrodynia** and **gastric ulcers.** A glass of cold water taken immediately on rising from bed helps the bowels to act. Bits of ice swallowed arrest **hæmatemesis.** Copious draughts of water help to wash out minute deposits of **urinary gravel.** If it is a uric acid calculus, drinking of distilled water diminishes its liability to deposition. Large draughts of water given between meals may arrest the formation of **gall-stones** by liquefying bile. As an *emetic*, warm water should not be given to over-distend the stomach, as it would paralyse its muscular fibres and thereby impede rather than promote vomiting. Half to one pint at a time is enough for this purpose.

ARACHIS OLEUM. Arachis Oil. N.O. *Leguminosæ.*

(*Ind. and Col. Addendum.*)

Syn. B. P.—Earth-nut oil, Ground-nut oil, Pea-nut oil.

Syn. I.V.—*Chiná-bádámer tel*, *Mátkaláier tel*, Beng. *Mungphali ke tel*, Hind.

Habitat.—India, Africa and Eastern Colonies.

Source.—Expressed without heat from the seeds of *Arachis hypogæa.*

Characters.—Pale yellow or greenish-yellow, odor faint nut-like, taste bland, nutty. Sp. gr. 0·916 to 0·918. Becomes rancid and thick slowly.

Composition.—(1) *Oleic.* (2) *Hypogæic.* (3) *Palmitic.* (4) *Arachic acids.*

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The oil makes a good substitute for olive and almond oils, and has long been used in Indian pharmacy in their stead, though not with the sanction of the B. P.

Internally.—It has a gentle **aperient** action. The seeds are very nutritive, as they contain 31·9 p. c. of nitrogenous compounds, 37·8 p. c. of starch and sugar and 11·8 p. c. of fatty matter. They are largely eaten in India, Africa and America.

ARAROBA. Araroba. N.O. *Leguminoseæ.*

Syn. B. P.—Goa Powder, Crude Chrysarobin.

Habitat.—Brazil (Bahia).

Source.—Found in cavities in the trunk of *Andira Araroba*, freed as much as possible from fragments of wood, dried and powdered.

Characters.—Brownish-yellow to umber-brown powder, yielding to hot chloroform not less than 50 p.c. of chrysarobin.

Enters into.—The preparation of Chrysarobin (*q. v.*).

CHRYSAROBIN. Chrysarobin.

Source.—Obtained from araroba by extracting with hot chloroform, evaporating to dryness and powdering.

Characters.—Crystalline, yellow, tasteless, inodorous powder. *Solubility.*—Entirely in hot chloroform, almost entirely in alcohol 90 p.c., partially in petroleum spirit, slightly in water.

Composition.—(1) *Chrysarobin*, Syn.—*Rhein*, *Chrysophan.* (2) *Chrysophanic Acid.*

OFFICIAL PREPARATION.

1. **Unguentum Chrysarobin.**—1 in 25.

NON-OFFICIAL PREPARATIONS.

1. **Pigmentum Chrysarobin.**—Chrysarobin 1 dr., Chloroform 10 drs., Gutta-percha (pure) 1 dr. Dissolve. Does not stain cloth.
2. **Ung. Acid. Chrysophanic.** (Malcolm Morris).—Acid. Chrysophanic. 20 grs., Ol. Deelinæ 2 drs., Lanolin to 1 oz. Mix.

PHARMACOLOGY.

Externally.—Chrysarobin is a powerful **irritant** to the skin producing a sort of erythematous inflammation. It does not irritate so much the diseased parts as the healthy skin. It destroys low vegetable growths infesting the surface of the body, and is therefore a powerful **parasiticide**. It is absorbed from the skin.

Internally.—Even in small doses, say $\frac{1}{8}$ gr., it powerfully irritates the gastro-intestinal mucous membrane, causing anorexia, vomiting and purging with gripes. It is therefore a powerful **gastro-intestinal irritant.**

It is eliminated chiefly by the kidneys and partly by the skin. The urine is stained purple.

THERAPEUTICS.

Externally.—As a *parasiticide*, it is a capital remedy for **ringworm** and other forms of **tinea.** The B.P. ointment not being strong enough, requires its strength to be increased occasionally. It is also useful in many chronic dry skin diseases, such as **psoriasis, eczema, acne rosacea.** An ointment ($\frac{1}{2}$ to 1 dr. in 1 oz. of heated vaseline) remarkably removes **chronic psoriasis** if it is rubbed into the parts morning and evening. One peculiarity in the action of this drug, which is not generally met with in others, is that it can cure the disease in other regions of the body if it is persistently rubbed into some selected spots on one side of it for sometime even after the final disappearance of the diseased patches. But this practice cannot be ordinarily followed for the skin becomes irritated as soon as the disease is removed.

Internally.—It should rather be not prescribed internally on account of its irritating properties, though success has sometimes been attained from its internal administration in **psoriasis, eczema, acne,** &c.

Prescribing hints.—Chrysarobin should not be applied to the face, though a mild ointment (15 grs. to 1 oz.) may not produce much irritation if applied to the scalp. To prevent the irritation of the surrounding healthy skin, its application should *exclusively be confined to diseased islands.* This may best be done by painting the parts with Pig. Chrysarobin, and covering the pigment with collodion, or by applying a stiff ointment covered over with a piece of isinglass or Mead's plaster. The stains on the linen may be removed by a weak solution of potash or chorinated lime, and partially by vegetable acids.

ARGENTI NITRAS. Silver Nitrate. $AgNO_3$.

Syn. B.P.—Lunar Caustic.

Source.—Prepared by the interaction of nitric acid and silver, $3Ag_2+8HNO_3=2NO+6AgNO_3+4H_2O$.

Characters.—Colorless, tabular, rhombic crystals. *Solubility.*—2 in 1 of water. *Impurities.*—Other nitrates.

Incompatibles.—Alkalis and their carbonates, bromides, chlorides, phosphates, iodides, acids (except nitric and acetic), alkaloids, and solutions of arsenic and tannin.

Dispensing hints.—It should be stocked and dispensed in amber-colored or uranium bottles (see p. 75), and its pill massed with kaolin, and paraffin ointment. (See p. 87.)

Action.—Caustic, astringent, antiseptic and nervine tonic. **B.P. Dose.**—¼ to ½ gr. *Daily Dose.*—3 grs. in pill.

Official Preparations.

1. **Argenti Nitras Induratus.** *Syn.—Toughened Caustic.*—Greenish-white cylindrical rods or cones obtained by fusing silver nitrate 475 grs. and potassium nitrate 25 grs. in a platinum capsule, and pouring into moulds.

2. **Argenti Nitras Mitigatus.** *Syn.—Mitigated Caustic.*—Greyish-white rods or cones obtained by fusing silver nitrate 1 oz. and potassium nitrate 2 ozs. as above.

ARGENTI OXIDUM. Silver Oxide. Ag_2O.

Source.—Prepared by mixing solutions of silver nitrate and calcium hydroxide, $2AgNO_3 + Ca(OH)_2 = Ag_2O + Ca(NO_3)_2 + H_2O$

Characters.—A brown powder which at a low red heat gives oxygen and yields metallic silver.

Incompatibles.—Chlorides, organic substances, creosote, phenol, potassium permanganate (see p. 111).

Action.—Tonic, antispasmodic. **B. P. Dose.**—½ to 1 gr. in pill.

Non-Official Preparations and Derivatives of Silver.

1. **Pigmentum Argenti Nitras Æthereum, L.H.**—Silver Nitrate 20 grs., Distilled Water 1 dr., Spt. Æther Nitrosi to 1 oz. As a paint on greasy skin,

2. **Argentamin.**—A solution of silver phosphate in ethylene-diamine solution. Antiseptic and astringent. As an injection (1 in 2,000 to 4,000) in gonorrhœa.

3. **Itrol.** *Syn.—Argenti Citras.*—A non-caustic powder soluble 1 in 4,000 of water. Antiseptic, astringent.

4. **Actol.** *Syn.—Argenti Lactas.*—In powder or crystals soluble in water. Antiseptic, astringent.

5. **Argentol.**—A compound of silver with oxychinoline. A sparingly soluble yellowish powder acting like iodoform. As an injection (1 in 1,000) in gonorrhœa.

6. **Argentum Colloidale** (Crede's). *Syn.—Collargol.*—Metallic silver in a colloid state. Its ointment (Arg. Coll. ½ oz., Aqua Dist. 1 ½ drs., Cera Alba. 2½ drs., Adep. Benz. 2 ozs. 2½ drs.) is rubbed in septic and inflammatory diseases with doubtful results.

7. **Argonin.**—A silver-casein compound soluble in hot water. Antiseptic, parasiticide. A 10 p.c. solution injected in gonorrhœa.

8. **Largin.**—A silver-albumen compound. A powerful germicide. 1 to 6 grs. in water 1 oz. for injection in gonorrhœa.

9. **Argenti Iodidi.**—An alterative in gastralgia and syphilis. *Dose.*—¼ to 1 gr. in pill.

10. **Protargol.**—A silver-protein compound. A powerful germicide. A ¼ to 1 p.c. solution makes a painless injection in gonorrhœa. A solution (¾ to 1¼ in 1½ ozs. of water) has been successfully used as a prophylactic against gonorrhœal infection, and internally in continued acute catarrhal diarrhœa.

PHARMACOLOGY OF SILVER SALTS.

Externally.—Soluble silver salts unite chemically with the albumen of the tissues and discharges and form albuminates, but their actions do not penetrate into deeper tissues. Applied to the unbroken skin in the form of a stick or concentrated solution silver nitrate produces at first a white stain which soon becomes blackened by exposure to light. This stain peels off as a dry black epidermis if the application is very light, or as a black slough with the inflammation of deeper layers if the application is prolonged. Hence it is a **caustic**. On the denuded surface a solution of silver nitrate acts as an **excitant** and is (1) decomposed by the albumen of the plasma and discharges, and is precipitated as an albuminate which coats its surface, (2) contracts the blood-vessels and capillaries, and (3) coagulates the blood both within and without them. It is therefore a local **astringent**, **hæmostatic** and **antiphlogistic**. All silver salts are powerful **antiseptics** (see p. 166).

Internally. **Mouth.**—Silver nitrate is decomposed by the albumen and chlorides of the saliva, and imparts an astringent taste. In a concentrated form it acts in the same way as on the skin. If it is administered long, it produces a dark bluish discoloration at the edges of the gums and inside of the cheeks.

Stomach and intestine.—The undecomposed portion reaching the stomach is again acted upon by the hydrochloric acid and mucus forming a double chloride of silver and sodium. In moderate doses it acts as an **astringent**, though not believed by some authorities, and in large doses as a **gastro-intestinal irritant**. Peptones dissolve the nitrate readily, but this solution does not precipitate albumen.

Blood.—Silver enters (we know not in what form) the blood. If it is not soon excreted or deposited in the organs, it collects in the red blood corpuscles and converts the hæmoglobin into hæmatin. Opinions differ as to its action as a **remote astringent.**

Nervous system.—Many there are who believe that silver in minute doses acts as a **nervine tonic** like copper or zinc. In toxic doses it is a **convulsant**, the convulsions being like those in strychnine poisoning. According to Gowers, it blunts the polarity of the nerve-centres when continued long, so that they are less easily influenced by external stimuli.

Skin.—If administered long, silver causes a leaden discoloration of the skin, due to the deposition of the reduced metal (?) in all the tissues of the skin except the rete Malpighi. Once deposited, it remains permanently in the tissues.

Elimination.—Silver salts are excreted by the fæces as a sulphide, staining them dark-brown, and by the intestinal secretion and bile. A portion is deposited in the organs, particularly the kidneys and liver.

Acute toxic action.—Severe vomiting, general prostration and nervous symptoms, particularly convulsions, are chiefly met with.

Chronic toxic action.—If silver is given internally for a long time, it causes impairment of digestion and nutrition, albuminuria, irregular cardiac action, paralysis as in lead poisoning, fatty degeneration and discoloration of the skin and other organs (*argyria*).

Antidotes.—In *acute poisoning* from accidental causes, mucilaginous drinks, such as thick gruel, should be immediately given to envelope the caustic followed by an emetic or stomach syphon. Common salt is a *chemical antidote.* White of egg, milk and water and other demulcents may be given freely. In *chronic poisoning,* the discoloration is said to be removed by the persistent use of large doses of potassium iodide and sodium hyposulphite but this requires confirmation.

THERAPEUTICS OF SILVER SALTS.

Externally. **Skin.**—The solid silver nitrate or mitigated caustic is of little value for destroying small **warts** or **excrescences.** It may be applied to **exuberant granulations, callous, indolent** or **lupoid ulcers, fistulæ, chancres,** &c., because of its limited caustic and after-stimulating effects on them. It is a valuable caustic for **post-mortem wounds,** but not a reliable one for **bites** by poisonous snakes and rabid animals, as its action does not penetrate into the deeper layers. It arrests **bleeding** from **leech-bites.** Its solution may arrest the **pitting of small-pox** if painted on the vesicles with or without their puncturing. It is a capital remedy (1 to 2 drs. in 1 oz.) for arresting the progress of **erysipelas** and threatening **boils.** A milder solution (5 to 20 grs. in 1 oz) disperses threatening **bed-sores, herpes** and **eczema** if painted over the erythematous patches. It allays the itching of **pruritus.** A solution of silver turns grey hair bluish-black. To effect this, the hair is first washed with a silver nitrate solution (1 in 12), and then a comb or brush dipped in a solution of potassium sulphurat (1 in 8) is applied.

Eyes and nose.—A solution of silver nitrate (5 to 10 grs. in 1 oz.) successfully removes **granular conjunctivitis** and **ophthalmia neonatorum** if brushed over under the influence of cocaine. A weaker solution (1 to 4 grs. in 1 oz.) may be used as a collyrium in **purulent conjunctivitis.** Solid silver nitrate or mitigated caustic removes **tinea tarsi.** Its weak solution makes a valuable irrigation in **rhinitis.**

Ear.—Brushing the meatus with a strong solution of silver, avoiding membrana tympani, often relieves the intolerable **pruritus** of the meatus.

Genitals.—Solid caustic is still used for cauterising **granular** or **ulcerated os** and **cervix.** A strong solution may be injected into or painted within the womb in **endometritis** or **endocervitis.** A weaker solution (1 to 2 grs. in 1 oz.) makes an effective injection in **gonorrhœa, leucorrhœa,** and **pruritus pudendi** due to leucorrhœa. An irrigation (1 in 1,00 to 10,000) has been successfully used in many cases of gonorrhœa. Many advocate injections of largin, itrol and protargol in gonorrhœa. (see p. 248).

Internally. **Alimentary Canal.**—Unhealthy or chronic **ulcers** in the mouth quickly heal after the touch of mitigated caustic. A solution (10 to 20 grs. in 1 oz.) is an excellent application for **sore-throat**, acute or chronic, **pharyngitis, follicular tonsillitis**, and **tubercular** and other **ulcerations** of the **larynx.**

Silver nitrate has been given in **dyspepsia** and **vomiting of yeasty fluid** with varying success. In pretty large doses (¼ to 2 grs.) it is sometimes used for cauterising **gastric ulcers**, but this mode of treatment is fraught with danger. **Chronic diarrhœa** rebellious to other drugs sometimes yields to silver nitrate. As an enema (1 dr. in 3 pints), it has been successfully employed in **chronic dysentery** and **ulceration** of the **bowels.**

Nervous system.—As a tonic it has been found useful in many nervous diseases, such as **locomotor ataxy, hemiplegia** and **epilepsy**, but the unpleasant symptoms of **argyria** are the chief barrier to its use. If, however, a leaden discoloration of the skin can be tolerated, a course of silver treatment may be adopted with decided benefit in epilepsy, without the evil consequences of the bromides.

Silver oxide is less irritating and has sometimes been found very useful in **gastrodynia**, and as a remote hæmostatic in **menorrhagia**.

Caution.—To avoid **argyria**, the use of the drug must be suspended as soon as a dark line is noticed on the edges of the gums, which may be removed by a course of acid tartrate of potassium. Its administration must be stopped for two weeks after two months' use, however small the dose may be. 100 grains should be the maximum dose per month.

Prescribing hints.—Silver salts are given in pills (see p 87) after food, but if their local action on the stomach is desired, they should be given on an empty stomach preferably in solution. For application to the skin, a solution of the nitrate in nitrous ether is the best, as it does not run in drops, but it is a stronger preparation than one dissolved in water.

ARISTOLOCHIA. Aristolochia. N.O. *Aristolochiaceæ.*

(*Ind. and Col. Addendum.*)

Syn.—The Indian Birthwort. **Syn. I.V.**—*Isarmul*, Beng. Hind.

Habitat.—India, Eastern Colonies.

Source.—The dried stem and root of *Aristolochia indica.*

Characters.—*Stem.*—In cylindrical pieces ⅝ in. in diameter, greyish-yellow, marked with scars and furrows. *Root.*—Dark-brown, transversely constricted, bark separable from wood. Odor spicy, camphoraceous. Taste bitter.

OFFICIAL PREPARATIONS.

1. **Liq. Aristolochiæ Conc.**—Aristolochia 10 ozs., Alcohol 20 p.c. 25 ozs. or *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 2 drs.

2. **Tinctura Aristolochiæ**—Powdered Aristolochia 4 ozs., Alcohol 70 p.c. *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The expressed juice of the root and leaves is considered by the natives of India an antidote to snake-bites when applied to the bitten part.

Internally.—The drug is a mild **bitter tonic** and is said to be useful in intermittent fever and other affections. It does not possess any other properties and is therefore not fit to be retained in the B.P.

ARMORACIÆ. Horseradish Root. N.O. *Cruciferæ.*

Habitat.—Britain, Europe, North America.

Source.—The fresh root of *Cochleria armoracia* collected from cultivated plants.

Characters.—Nearly cylindrical except at the crown where it is enlarged, marked with semi-amplexicaul leaf-scars.

Identification.—It is strange that this root has been mistaken for Aconite root. Their differential characters are tabulated below:—

Horseradish Root.	Aconite Root.
Size.—Larger, 1½ in. in diameter, 1 ft. long, nearly cylindrical.	*Size.*—Smaller, ½ to ¾ in. in diameter, gradually tapering.
Color.—Pale-yellowish without, whitish and fleshy within.	*Color.*—Dark-brown without, whitish and starchy within.
Odor.—Pungent.	*Odor.*—*Nil.*
Taste.—Pungent.	*Taste.*—Persistently tingling.

Composition.—(1) A *volatile oil* allied to the volatile oil of the black mustard seeds. (2) Other constituents.

Action.—Sialagogue, stimulant, diuretic.

OFFICIAL PREPARATION.

1. **Spiritus Armoraciæ Compositus.**—1 in 8. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY.

Externally.—It is a **rubefacient** like mustard, but is never used as such.

Internally.—It increases the salivary and gastric secretions, and after absorption stimulates the kidneys and sweat-glands during its excretion. It is therefore a **sialagogue, gastric stimulant, diuretic** and a feeble **diaphoretic.**

THERAPEUTICS.

Internally.—An infusion of equal parts of fresh root and black mustard seeds has been found to be an effective **gargle** for relaxed condition of the throat. The root may be chewed in **toothache** and **paralysis** of the tongue and cheeks. It has been usefully employed in **atonic dyspepsia, chronic rheumatism** and **dropsy**. The compound spirit is a good flavoring carminative.

ARNICÆ RHIZOMA. Arnica Rhizome. N.O. *Compositæ.*

Syn. B.P.—Arnicæ Radix.

Habitat.—Mountainous regions of Central and Southern Europe.

Source.—The dried rhizome and roots of *Arnica montana.*

Characters.—Cylindrical, dark brown, 1 to 2 in. long, $\frac{1}{6}$ to $\frac{1}{4}$ in. thick, curved, rough. Bears amplexicaul leaf-scars and wiry rootlets. Taste acrid, bitter. Odor aromatic.

Identification.—It resembles *Serpentary* and *Valerian* distinguishable by their general characters and their characteristic odors, and *Veratrum Veride* distinguishable by its thicker rootlets.

Composition.—(1). *Arnicin* the active principle. (2). *Volatile oil.* (3). *Innulin.* (4). A *resin.*

OFFICIAL PREPARATION.

1, **Tinctura Arnicæ.**—1 in 20.

ARNICA FLORIS. Arnica Flowers.

(*Ind. and Col. Addendum.*)

Source.—The flower-heads of *Arnica montana.*

Characters.—The flower-heads consist of a scaly involucre in two rows and a hairy receptacle, bearing 16 to 20 yellow three-toothed, ten-nerved ray-florets, and numerous yellow five-toothed tubular disc-florets. Odor aromatic. Taste bitter.

OFFICIAL PREPARATION.

1. **Tinctura Arnicæ Florum.**—Flowers 2 ozs., Alcohol 45 p.c. *q.s.* By percolation to 1 pint. **B.P. Dose.**—$\frac{1}{2}$ to 1 dr.

PHARMACOLOGY.

Externally.—Arnica **stimulates** the **cutaneous blood-vessels**, and when its evaporation is stopped, causes hyperæmia, eczema and spreading erythematous inflammation simulating erysipelas.

Internally.—Like volatile oils, it is a **warm aromatic** and **stimulant** to the alimentary canal, increasing gastric and intestinal peristalsis. In large doses it is a powerful **gastro-intestinal irritant.** In small doses, it **reflexly excites** the vascular and nervous systems, and in large doses depresses them, producing partial insensibility, convulsions and syncope. It is a **remote stimulant** to the skin and kidneys.

THERAPEUTICS.

Externally.—Arnica is chiefly used as a lotion (1 to 4 drs. in 1 pint) in **bruises** and **sprains**. According to Garrod the good effects, if any, are due to the spirit of the same strength rather than to the tincture.

Internally.—Many fancied therapeutical uses have been suggested, *e.g.*, in fever, delirium tremens, rheumatism, chronic bronchitis, dysentery with doubtful results. The tincture of the flowers is considered more active than that of the root and is largely employed in the American Colonies.

ASAFETIDA. Asafetida. N.O. *Umbelliferæ.*

Syn. I.V.—*Hing*, Beng. *Hingrá*, Hind , Bom.

Habitat.—Afghanistan, the Punjab, Persia and Turkistan.

Source.—A gum-resin obtained by incision from the root of *Ferula fœtida.*

The fine quality is known as *khándáhári-hing.* The common one as *hingrá.*

Characters.—In rounded or flattened, agglutinated, dull yellow tears, darkening on keeping. Internally yellowish, translucent, or milky-white, opaque. Odor strong, persistent, alliaceous. Taste bitter, acrid, alliaceous. When triturated with water forms a white emulsion. Should contain not less than 65 p.c. of soluble matter in alcohol 90 p.c. *Impurities.*—Earthy matter, flour, gypsum, and pieces of roots.

Identification.—It resembles *Ammoniacum*, *Benzoin* and *Galbanum*, distinguishable by its strong characteristic alliaceous odor.

Composition.—(1). *Volatile oil,* 5 p.c., containing essential oil of garlic allyl persulphide which gives it its peculiar odor. (2). *Bassorin resin*, 65 p.c. (3). *Gum* 25 p.c.

Action.—Stimulant, antipasmodic. **B.P. Dose.**—5 to 15 grs.

Enters into.—Pil. Galbani Co. and the

OFFICIAL PREPARATIONS.

1. **Pilula Aloes et Asafetida.**—1 in 4. **B.P. Dose.**—4 to 8 grs.
2. **Spiritus Ammoniæ Fetidus.**—33 grs. of Asafetida in 1 oz. **B.P. Dose.**—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.
3. **Tinctura Asafetida.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Externally.—Asafetida has a very feeble stimulating effect on the skin.

Internally. **Gastro-intestinal canal.**—Like aromatic oils and resins, it is a **stimulant**, **carminative** and **antispasmodic**, expelling flatus and relieving spasm ; but its nasty nauseous taste is a drawback to its use. In large doses it causes vomiting and purging. It is absorbed by the mucous membrane.

Lungs.—Like onion it increases and disinfects the bronchial secretion during its elimination. Hence it is a **disinfectant expectorant.**

Nervous System.—It **reflexly stimulates the nervous system** through the mouth and stomach.

Elimination.—By the bronchial secretion and urine.

THERAPEUTICS.

Externally.—A thick emulsion prepared by triturating with water is often applied by the writer to the abdomen of infants in **tympanitis** with benefit.

Internally.—It is rarely used now except in **hysteria** and **tympanitis.** In the latter disease it may be given as an **enema** (30 grs. rubbed with water 4 ozs.). Spt. Ammon. Fetid. is an excellent antispasmodic for **flatulent colic** of children or **hysterical flatulence** of young women. Cases of malingering may be cured sometimes by giving effervescing draughts containing a few minims of asafetida and valerian 3 or 4 times a day. The eructations of these drugs repeat the nasty taste in the mouth.

Prescribing hints.—It is best given in pills capsuled or varnished. If its tincture is prescribed, it should be suspended by mucilage.

ATROPINA. See Belladonnæ Folia.

AURANTII CORTEX RECENS.

Fresh Bitter Orange Peel. N.O. *Rutaceæ.*

Syn. I.V.—*Kamlá nembur-khosá*, Beng. *Nárengi ke boklá*, Hind.

Habitat.—Southern Europe, India and Eastern Colonies.

Source.—The fresh outer part of the pericarp of *Citrus Aurantium, var. Bigaradia.*

Characters.—Externally orange-red, rough, glandular. Inner surface whitish spongy. Odor pleasant, aromatic. Taste bitter.

OFFICIAL PREPARATIONS.

1. **Syrupus Aromaticus.**—*Syn.—Simple Elixir.*—**B.P. Dose.**—½ to 1 dr.
2. **Syrupus Aurantii.**—1 in 8. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Aurantii.**—1 in 4. **B. P. Dose.**—½ to 1 dr. *Enters into.*—Conf. Sulph., Syr. Aurant., Syr. Aromat., Syr. Cascar. Aromat. Tr. Quininæ, and Troch. Sulph.
4. **Vinum Aurantii.**—**B.P. Dose.**—½ to 2 ozs. *Enters into.*—Vin. Quininæ and Vin. Ferri Citratis.

AURANTII CORTEX SICCATUS.

Dried Bitter Orange Peel.

Source and characters.—The dried outer pericarp of *Citrus Aurantium, var. Bigaradia*, in thin strips.

Composition.—(1) *A fixed oil*, 1 to 2 p.c., which consists of a terpene, dextro-rotatory limonene. (2) 3 *glucosides*—hesperidin, isohesperidin, and aurantiamarin.

Enters into—Inf. Gentian. Co., Spt. Armoraciæ Co., Tr. Cinch. Co., Tr. Gentianæ, Co. and the

OFFICIAL PREPARATIONS.

1. **Infusum Aurantii.**—1 in 20. **B P. Dose.**—½ to 1 oz.
2. **Infusum Aurantii Compositum.**—1 in 40. **B.P. Dose.**—½ to 1 oz.

AURANTII FLORIS AQUA. Orange-Flower Water.

Source and characters.—A commercial, colorless or greenish-yellow, fragrant water obtained by distilling the flowers of bitter orange tree.

To be diluted with twice its volume of distilled water before use.

OFFICIAL PREPARATION.

1. **Syrupus Aurantii Floris.**—1 in 6¾. **B.P. Dose.**—½ to 1 dr.

AURANTII CORTEX INDICUS. Indian Orange Peel.

(*Ind. and Col. Addendum.*)

Source.—The fresh and the dried outer part of the pericarp of varieties of *Citrus Aurantium* grown in India and Ceylon.

In India and the Colonies this may be used for the same purposes as the other orange peel.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The orange-flower water may be used as a vehicle for lotions. The neroli oil is used for perfuming hair-oils and pomades.

Internally.—The bitter orange-peel is feebly **bitter stomachic** and **tonic**, and is generally used in combination with other bitters, such as gentian. The water is mainly used as a flavoring agent.

AZADIRACHTA INDICA. Indian Azadirach.

N.O. *Meliaceæ.* (*Ind. and Col. Addendum.*)

Syn. B. P.—Neem Bark, Margosa Bark.

Habitat.—India, Eastern Colonies.

Source.—The dried bark of the stem of *Melia Azadirachta.*

Characters.—Externally rusty-grey. Internally yellowish, foliated, fibrous. Taste bitter, slightly astringent. Inodorous.

Composition.—A *bitter principle* of a resinous nature is believed to be present in the inner bark.

OFFICIAL PREPARATIONS.

1. **Infusum Azadirachtæ Indicæ.**—Bark 88 grs., Water 20 ozs. for 15 minutes. **B.P. Dose.**—½ to 1 oz.

2. **Tinctura Azadirachtæ Indicæ.**—1 in 10. Bark 2 ozs., Alcohol 45 p. c. 1 pint. By maceration. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Almost every part of the plant is used for medicinal purposes in India.

Externally.—The leaves in the form of a decoction or poultice are largely employed **to stimulate foul** and **indolent ulcers** to a healtheir action. The decoction is also used as a local wash or a general bath in many skin diseases. (See p 95.) Obstinate cases of ulcers have been cured by neem-poultice by the writer. Weeping **eczema** quickly heals if a cold neem-poultice of bruised leaves is applied and allowed to drop off itself. The leaves are said to prevent the ravages of white ants.

The oil extracted from the seeds is considered to be a valuable local **stimulant, antiseptic** and **insecticide**, and is often employed in **chronic rheumatism, chronic scrofulous ulcers** and many **scaly skin diseases**. Some consider it a valuable remedy for **itch**. Alone or in combination with chalmoogra oil or gurjan balsam, it is considered to be an effective application in **leprosy**.

Internally—The bark is a **bitter tonic, astringent** and **antiperiodic**, the outer layers possessing the astringent virtue. Before the introduction of quinine into this country, the bark either in powder (1 dr.) or in concentrated decoction, was largely employed by the natives to check **ague**. Its decoction is employed even now in many cases of malarious fevers where quinine fails to effect a cure, or while the patient is convalescing as a tonic. The root bark is said to possess **anthelmintic** property besides.

The tree exudes a sort of *gum* which is considered to be a stimulant and tonic, and a sort of *saccharine sap* or toddy which is regarded to have refrigerant, stomachic and alterative properties. The fruits are said to be antiseptic, emollient, purgative and anthelmintic.

BALSAMUM PERUVIANUM. Balsam of Peru.

N.O. *Leguminosæ.*

Habitat.—Salvador in Central America.

Source.—A balsam exuded from the trunk of *Myroxylon Pereiræ.*

Characters.—A blackish viscid liquid in bulk, or reddish brown, transparent in thin layers. Odor agreeable, balsamic. Taste acrid. *Solubility.*—Insoluble in water, easily in chloroform, and 1 in 1 of alcohol 90 p c., but on addition of more alcohol the mixture becomes turbid. *Impurities.*—Copaiba, resins, castor oil and other fatty oils, gurjan balsam and ethylic alcohol.

Composition.—(1) A *volatile oil,* which consists of cinnamin, styracin, peruvin, styrone and benzoate of benzyl. (2) *Cinnamic acid.* (3) *Benzoic acid.* (4) *Resins.*

Action.—Stimulant, disinfectant, expectorant.

B.P. Dose.—5 to 15 ms. in emulsion with mucilage, or sugar and yolk of egg with water.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—On account of the volatile oil it contains, the balsam of Peru is an **antiseptic** and **stimulant** to the skin and abraded surface, and may be applied to **wounds, indolent ulcers, bed-sores,** &c. Mixed with vaseline (1 in 7) it removes **sore-nipples** and **cracked lips.** The vapor of the volatile oil **kills pediculi,** and **acarus** of the itch, therefore the balsam may be used in **body lice** and **scabies.** This is a more agreeable remedy than the preparations of sulphur, and the method of application is the same as that of sulphur (which see). It allays the itching of **urticaria** and **eczema.**

Internally.—Like most volatile oils, it is a **stimulant** and **carminative.** During its elimination through the bronchial mucous membrane, it **stimulates** and **disinfects** its **secretion,** and is therefore used as an **expectorant** in **chronic bronchitis.** It is also eliminated by the skin and kidneys, and helps sometimes to disinfect and lessen the discharge in **gleet.**

BALSAMUM TOLUTANUM. Balsam of Tolu.

N.O. *Leguminosæ.*

Habitat.—New Granada.

Source.—Obtained by making incisions in the trunk of *Myroxylon Toluifera.*

Characters—A soft, tenacious solid when first imported; hardens on keeping; brittle in cold weather; yellowish-brown and translucent in thin films. Odor fragrant. Taste aromatic, slightly acid. *Solubility.*—In alcohol 90 p.c. *Impurity.*—Spurious articles not answering the B.P. test.

Composition.—(1) *Toluene.* (2) *Benzoic acid.* (3) *Cinnamic acid.* (4) *Tolu-resinotannol.* (5) *Benzyl cinnamate.* (6) *Benzyl benzoate.* (7) *Vanallin.*

Action.—Expectorant. **B.P. Dose.**—5 to 15 grs. in emulsion with mucilage, or yolk of egg and sugar with water.

Enters into.—Tr. Benzoin. Co. and the

OFFICIAL PREPARATIONS.

1. **Syrupus Tolutanus.**—1 in 29. **B.P. Dose.**—½ to 1 dr.
Enters into.—Mist. Ammoniaci. Sweetens cough mixtures.

2. **Tinctura Tolutana.**—1 in 10. Bright reddish-brown. **B.P. Dose.**—½ to 1 dr. in emulsion.
Enters into.—Tolu basis for lozenges (see p. 56).

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Its actions resemble those of balsam of Peru. Its syrup is used as a flavoring vehicle for cough mixtures. The tincture is a feeble **expectorant**.

BELÆ FRUCTUS. Bael Fruit. N.O. *Rutaceæ.*

(*Ind. and Col. Addendum.*)

Source.—The fresh half-ripe fruit of *Ægle Marmelos.*

Characters.—3 in. in diameter, ovoid or pyriform, smooth. 10 to 15 cells containing wooly seeds. Pulp juicy (?), hard and brittle on drying. Taste mucilaginous, sweetish, astringent.

Composition.—(1) *Tannin.* (2) *Pectin.* (3) *Mucilaginous principles.* (4) *Sugar*, &c.

OFFICIAL PREPARATION.

1. **Extractum Belæ Liquidum.**—1 in 1. Bruised fruit 20 ozs., Water 15 pints, Alcohol 90 p.c., *q.s.* By maceration and evaporation. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The description of the actions of the bael fruit as given by English writers is ambiguous. The unripe fruit is an **astringent**, while the pulp of the ripe one is a gentle **stimulant** to the intestinal mucous membrane and **aperient**. In some the latter causes constipation. The pulp of the roasted unripe fruit, or a decoction of the sun-dried unripe slices (*bael suti*), possesses more astringent property and is used more effectively in **mucus diarrhœa** and **acute dysentery**. The compound or dietetic bael powder (powdered pulp 1, arrowroot 1) may be employed in the same class of cases. The ripe pulp is considered to be very serviceable in obstinate **catarrhal diarrhœa, chronic dysentery** and certain forms of **dyspepsia** characterised by alternate constipation and diarrhœa.

The root-bark of the plant is a mild febrifuge and enters into the composition of the "ten roots"—*dasha mula*—so frequently prescribed by the vaids or practitioners of Hindu system of medicine in mild fevers.

BELLADONNÆ FOLIA. Belladonna Leaves.

N.O. *Solanaceæ.*

Syn.—Deadly Nightshade Leaves, Dwale Leaves.

Habitat.—Britain.

Source.—The fresh leaves and branches of *Atropa Belladonna*, collected when the plant is in flower.

Characters.—Leaves alternate below, in unequal pairs above, 3 to 8 in. long, broadly ovate, acute, entire, glabrous, short stalked. Corolla gamopetalous, campanulate, purple.

Identification.—They resemble *Stramonium Leaves*, which are more wrinkled ; and *Hyoscyamus Leaves*, which are hairy.

Composition—(1). *Hyoscyamine*, 0·5 to 0·9 p.c. is the natural alkaloid, which is converted into atropine.

Action—Anhydrotic, antigalactogogue, anodyne, narcotic, deliriant, mydriatic. A powerful poison.

Official Preparations.

1. **Atropina.**—See p 261.
2. **Extractum Belladonnæ Viride.**—Green. **B.P. Dose.**—¼ to 1 gr.
3. **Succus Belladonnæ.**—Alkaloids 1 p.c. Brownish. **B.P. Dose.**—5 to 15 ms.

Non-Official Preparations.

1. **Ext. Bellad. Fol. Alcoholic. B.P.C.**—A soft extract used in the preparation of—

(*a*). **Collodium Belladonnæ. B.P.C.**—Alkaloids 44 grs. to 1 pint. An anodyne pigment drying quickly.

(*b*). **Empl. Bellad. Virid. B.P.C.**—Alcoholic Extract of leaf *q.s.* containing alkaloids 11 grs., Resin Plaster *q.s.* to 10 ozs. M. Is half the strength of the B.P. plaster.

BELLADONNÆ RADIX. Belladonna Root.

Source.—From *Atropa Belladonna*, collected in the autumn and dried.

Characters.—In cylindrical pieces, entire or longitudinally split, ⅜ to ¾ in. thick, 6 to 12 in. long, pale-brownish and wrinkled longitudinally. Fracture short. Internally white, starchy, with no radiate appearance.

Identification.—It resembles *Pyrethrum*, which is unbranched, has a radiate fractured surface and gives a burning taste ; and *Scammony*, which is larger.

Composition.—The same as that of the leaves (see above).

Official Preparations.

1. **Atropina**—See p. 261.
2. **Emplastrum Belladonnæ.**—Alkaloids 0·5 p.c. 1 in 6.
3. **Extractum Belladonnæ Alcoholicum.**—Alkaloids 1 p.c. Dark-semi solid. **B.P. Dose**—¼ to 1 gr.
4. **Extractum Belladonnæ Liquidum.**—Alkaloids ¾ gr. in 110 ms. A dark-brown liquid.
5. **Linimentum Belladonnæ.**—Alkaloids 0·38 p.c. Yellowish-brown.
6. **Suppositoria Belladonnæ.**—Alkaloids $\frac{1}{60}$ gr. in each.
7. **Tinctura Belladonnæ**—Standardised. $\frac{1}{20}$ gr. of alkaloids in 110 ms. **B.P. Dose.**—5 to 15 ms. 1 m. for a child 1 year old.
8. **Unguentum Belladonnæ.**—Alkaloids 0·6 p.c. Brownish.

Non-Official Preparations.

1. **Chloroformum Belladonnæ. B.P.C.**—Prepared like Chlorof. Aconiti (See p. 202.)

2. **Glycerinum Belladonnæ. B.P.C.**—Extract 1 oz., Boiling Water 1 dr., Glycerin *q.s.* to 2 ozs. Rub with water in a warm mortar to produce a smooth paste and mix glycerin.

ATROPINA. Atropine. $C_{17}H_{23}NO_3$.

Source.—An alkaloid obtained from Belladonna leaves and root.

As a conversion product, it may also be obtained from *Datura Stramonium* and *Hyoscyamus Niger.*

Characters.—In colorless, acicular crystals. *Solubility.*—1 in 300 of water, readily in alcohol 90 p.c., chloroform and ether. The solution is *alkaline.*

Incompatibles.—Caustic alkalis decompose it.

Action.—A virulent poison. A powerful anodyne and sedative. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. *M. S. Dose.*—$\frac{1}{15}$ gr.

OFFICIAL PREPARATIONS.

1. **Atropinæ Sulphas.**—See below.
2. **Unguentum Atropinæ.**—1 in 50. A local anodyne.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Oleatum Atropinæ.**—Atropine 5, Oleic Acid 200, dissolve on a water-bath and mix. An anodyne pigment.
2. **Ung. Atrop. c. Cocain. L.O.H.**—Atropine 4 grs., Cocaine 10 grs., Soft Paraffin 1 oz. Mix by heat. In ophthalmic practice.
3. **Homatropine** and its salts.—Hydrochloride, hydrobromide (*off.*) and salicylate are quick local mydriatics. Their effects do not last long.
4. **Euphthalmine.** *Syn.—Hydrochloride of n-Methyl-vinyl-diacetone-alkamine.*—A synthetic compound recently introduced to compete with the natural atropine. A 5 to 10 p.c. solution dilates the pupil like homatropine, but its effects are not so lasting.

ATROPINÆ SULPHAS. Atropine Sulphate. $(C_{17}H_{23}NO_3)_2H_2SO_4$.

Source.—Obtained by neutralising atropine with diluted sulphuric acid.

Characters.—In colorless crystals. *Solubility.*—1 in 1 of water, 1 in 10 of alcohol 90 p.c. The solution is *neutral.*

Action.—Same as that of Atropine. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. *M.S. Dose.*—$\frac{1}{15}$ gr.

OFFICIAL PREPARATIONS.

1. **Lamellæ Atropinæ.**—Each contains $\frac{1}{5000}$ gr.
2. **Liquor Atropinæ Sulphatis.**—1 gr. in 110 ms. A colorless solution, which causes pain to the eye. **B.P. Dose.**—$\frac{1}{2}$ to 1 m.

HOMATROPINÆ HYDROBROMIDUM. Homatropine. Hydrobromide. $C_{16}H_{21}NO_3HB_r$.

Syn. B.P. (Add. 1890.).—Hyrobromate of Homatropine.

Source.—The hyrobromide of an alkaloid prepared from tropine.

Atropine splits up into tropic acid and tropine under the action of barium hydrate. Tropine, combined with amygdalic acid and acted upon by diluted hydrochloric acid, forms *Homatropine.*

Characters—A white crystalline powder or aggregation of minute trimetric crystals. *Solubility.*—1 n 6 of water.

Action.—Mydriatic. **B. P. Dose.**—$\frac{1}{80}$ to $\frac{1}{20}$ gr.

OFFICIAL PREPARATION.

1. **Lamellæ Homatropinæ.**—$\frac{1}{100}$ gr. in each.

NON-OFFICIAL PREPARATION.

1. **Oleum Homatrop. c. Cocaina. L.O.H.**—Homatropine (pure) 10 grs., Cocaine (alkaloid) 10 grs., Castor oil 1 oz. Dissolve by heat.

PHARMACOLOGY.

Externally.—The unbroken skin absorbs the alkaloids of belladonna if combined with alcohol, chloroform, glycerin or fat. Exposed mucus surface and raw skin absorb them more rapidly. Both belladonna and atropine powerfully paralyse the periphery of the sensory nerves, especially if there is pain, and are therefore **local anæsthetics** and **anodynes**. To a much less extent they depress the terminations of the motor and special nerve-endings, *e. g.*, the nerves of the sweat and milk glands. Hence they are **local anhydrotics** and **antigalactogogues**. They also first contract then dilate the local blood-vessels.

Internally.—Atropine readily enters the blood and circulates unaltered without affecting the blood corpuscles. It chiefly affects the nervous system : other organs and tissues are indirectly influenced through its action on their special or secretory nerves. Therefore we shall first notice its actions on the nervous system proper and afterwards on other organs of the body.

Nervous system.—The action of belladonna on the nervous system is most important, as through its agency all other actions in the body are performed

1. *Cerebrum.*—In medicinal doses belladonna scarcely produces any effect on the convolutions, but in large doses it is a **deliriant,** causing incoherent delirium with somnolence and constant desire to move about though languid at the same time, disordered vision, and insensibility. No true **coma** even in poisoning.

2. *Medulla and cord.*—Two chief centres are powerfully affected by belladonna, *viz.*, (*a*) the **respiratory** and (*b*) the **vasomotor**. The vagal centre is affected to a much less extent. It also slightly increases then diminishes the **reflex excitability.** It causes tetanus in frogs, not in man.

3. *Sensory nerves.*—Belladonna, whether locally applied or given by the mouth, **depresses the periphery of the sensory**

nerves and thereby relieves pain if present. It is therefore a **local** and **general anodyne**. Its action is not so powerful as that of atropine. As a general anodyne atropine is inferior to morphine. (See p. 159)

4. *Motor nerves and voluntary muscles.*—The motor nerves are **depressed** by large doses of belladonna.

5. *Splanchnics and intestine.*—Small doses depress the **inhibitory fibres of the splanchnics supplying the intestinal walls** and thus increase peristalsis and act as an **aperient** (see p 129). Large doses arrest peristaltic movements, but the muscular coat retains irritability. The sensory and vasomotor fibres are not affected.

6. *Nerves of the bladder, urethra, uterus,* &c.—The terminations of the nerves supplying the involuntary muscles of the bladder, urethra, ureter, vesiculæ seminales, uterus and vagina are depressed.

7. *Third nerve in the eye.*—Atropine dilates the pupil whether locally applied or given by the mouth. This is due to the **paralysis of the terminations of the third nerve** in the iris. The muscular fibres of the iris are not affected, as they contract in atropinized pupil if stimulated. It also paralyses the periphery of the same nerve in the ciliary muscle. Hence it is a powerful **local** and **remote mydriatic** and **paralyser of accommodation** (see p. 162). So powerful are the local effects of atropine on the eye, that it can dilate the pupil in a recently excised eye, and also that of the eye whose third nerve has been divided. As the pupil dilates of itself after the division of the third nerve, so the further dilatation of such a dilated pupil after the dropping of atropine, is due to the stimulation of the endings of the sympathetic fibres in the iris. In large doses it **increases intra-ocular tension**. The action of atropine on the eye is not central but immediate and remote local.

8. *Vagal ends in the heart.*—The vagus is the inhibitory nerve of the heart. Belladonna briefly **stimulates the endings of the vagus** in the heart, causing the slowing of the pulse, but soon **paralyses** them rendering the **pulse-beat more rapid**. This rapidity cannot be diminished by stimulating the vagus. At times the excitement becomes so strong that the heart-sounds may be heard a few feet from the patient. With the acceleration of the pulse, belladonna **does not reduce the force and tone of the heart**. According to some authorities, the frequency of the pulse is to some extent also due to the slight stimulation of the cardiac accelerator nerves. The vagal centre and the trunk are also slightly depressed, and the primary slowing of the pulse, according to some authorities, may be due to the excitation of this centre. In toxic doses the heart is paralysed and stops in diastole.

9. *Vagal ends in the bronchial walls.*—Both the **afferent**

and efferent terminal ends of the filaments of the vagus are paralysed after a brief stimulation, producing **relaxation** of the muscular coat of the tubes, and diminishing the **sensibility** and **reflex action** (paralysis of the afferent fibres). Thus belladonna is a **bronchial antispasmodic** and cough reliever. It also diminishes the bronchial secretion.

The **respiration** becomes **quicker** and **deeper** by the stimulation of the medullary and spinal respiratory centres, but **shallow** and **dyspnœac** from their paralysis by large doses.

10. *Vasomotor nerves and the skin.*—Like its action on the vagal centre, belladonna in full doses first **stimulates** then **paralyses** the vasomotor centre in the medulla. As a result of this, the peripheral blood-vessels first **contract** and then **widely dilate**. During this period of contraction, the **blood-pressure rises considerably.** This is also greatly helped by the simultaneous acceleration of the heart's action from the paralysis of the cardiac vagal terminations. With the dilatation of the blood-vessels, the **blood pressure falls**. The spinal vaso-motor centres are only brought into action when the heart is paralysed and the blood-pressure is extremely low. The **flushing** or **scarlatiniform** or **erythematous rash** on the skin so often seen in belladonna poisoning is no doubt due to the dilatation of the peripheral blood-vessels.

11. *Secretory nerves.*—Atropine is a powerful **paralyser of almost all the secretory nerve-endings** in the body, thereby exercising a most powerful depressant influence on the secretions of most of the secretory organs. Its actions on these organs are given below :—

(*a*) *Salivary and mucous glands.*—Even in small doses atropine powerfully **paralyses the periphery of the secretory fibres of the chorda tympani**, but not the vaso-dilator ones, as the stimulation of the chorda tympani does not stimulate the flow of saliva from the submaxillary gland, though its vascularity is increased. It also depresses the periphery of the secretory nerves of the other salivary and mucous glands. As a consequence of these actions, the mouth, palate and throat become dry and red. In large doses the dryness increases so much that deglutition becomes impossible. Hence atropine is a powerful **antisialagogue** (see p.p. 123-4).

(*b*) *Gastro-intestinal glands.*—Recent researches go to prove that atropine greatly lessens the percentage of HCl secreted by the stomach without very much affecting the secretion of pepsin. But after a prolonged use the gastric glands become accustomed to its use and are not responded to by it.

(*c*) *Liver and pancreas.*—According to Brunton and others, their secretions are depressed.

(*d*) *Bronchial glands.*—The secretion of the bronchial and tracheal mucus is very much diminished.

(*e*) *Sweat-glands.*—Either locally applied or given by the mouth atropine powerfully checks sweating. This it does by paralysing the periphery of the secreting nerves supplying the cells of the sweat-glands. It is therefore a **local** and **general anhydrotic.**

(*f*) *Mammary glands.*—In the same manner the secretion of milk is also arrested. Hence it is a **local** and **remote anti-galactogogue.**

(*g*) *Lachrymal glands.*—Prolonged use of atropine arrests their secretion.

(*h*) *Kidneys.*—Here its action is uncertain. Sometimes it increases **diuresis.** With large doses it causes retention of urine brought on by the paralysis of the bladder.

Temperature.—Belladonna raises the temperature of the body to 3 or 4 degrees in toxic doses. Hence it is a true **calori-crescent.** With the failure of the circulation it falls.

Elimination.—Atropine is excreted unaltered by the urine within 10 to 20 hours. It increases urea, phosphates, sulphates but not chlorides in the urine.

Toleration.—Children can bear large doses of belladonna (see p. 119). Old people bear it badly. Pigeons and rodents are insusceptible to it.

Summary of actions.—(1) Atropine paralyses the terminal ends of (*a*) the sensory, (*b*) the secretory and (*c*) the third nerve. (2) It is a deliriant. (3) It first stimulates and then depresses the three **vital centres**—(*a*) respiratory, (*b*) vagal and (*c*) vaso-motor. (4) It paralyses the inhibitory fibres of the splanchnics. (5) Causes flushing of the skin and raises temperature. (6) Depresses motor ends in toxic doses.

Methyl and Ethyl-atropines do not cause tetanus in frogs and paralyse the motor ends, but they act like atropine on the eye, heart, &c.

Acute toxic action.—The symptoms that follow a moderate dose of atropine are dryness of the mouth and throat with difficulty of swallowing, dilatation of pupils, confused vision, dry skin and slow pulse. Larger doses bring on these symptoms more quickly. The face, conjunctiva and skin are flushed, the pulse becomes frequent, sometimes doubled. The patient feels giddy, staggers, and is delirious. The skin becomes hot, uniformly red or erythematous; pupils widely dilated; bowels relaxed; micturition difficult and painful; respiration slow and deep; unconsciousness alternating with delirium and death from cardiac paralysis combined with asphyxia. At the *post mortem* all organs are in a state of venous congestion due to asphyxia.

The symptoms of poisoning have been observed after the application of plaster, glycerin of belladonna or liniment.

Antidotes.—Emetics or pump. Tannin, tea, charcoal. Morphine, caffeine or pilocarpine hypodermically. Physostigmine and chloral hydrate are also recommended. Stimulants, hot bottles, artificial respiration. As the poison is eliminated by the urine, the bladder is to be emptied now and then by the catheter to prevent reabsorption.

Physiological antagonists.—Morphine, pilocarpine, physostigmine, aconitine, chloral hydrate, hydrocyanic acid, muscarine, &c. Of these the first three are most powerful.

THERAPEUTICS.

Externally. **Skin.**—As a local *anodyne*, belladonna in the form of liniment, plaster or ointment is largely employed to soothe the irritability or pain in **neuralgia**—especially intercostal and supra-orbital—**soreness of muscles**, as of the chest in **phthisis**, **pleurodynia**, **hyper-sensibility** and **pruritus** of the skin **acute gout** and **rheumatism**, &c. Chloroform. Belladonnæ B.P.C., Ung. Atropin. or Oleat. Atropin. are most powerful in this respect. Occasionally atropine injected subcutaneously as near the nerve as possible does more good in neuralgia, especially in **sciatica**, than any local applications. As an *anodyne* and *antiphlogistic*, Glycerin. Belladon. or Collod. Belladon. may be used in **boils, threatening abscesses, carbuncles, ovaritis, orchitis, erysipelas, pelvic cellulitis**, &c. Liniment of belladonna rubbed three or four times a day, or a hypodermic injection of atropine in obstinate cases, checks **local sweating**. In the form of an ointment alone or better with conium, belladonna lessens the spasm of **anal fissure** and pain and irritation of **piles**.

Female diseases.—As an *antigalactogogue* or *antiphlogistic*, belladonna is very useful in stopping the secretion of milk, or in subduing the inflammation of the breast of the mother, who for some reason or other is unable to nurse her child. Extract of belladonna with glycerin (5 to 10 grs. to 1 oz.) in cotton wool may be used as a pessary in **inflammation** of the **womb** or **cervix**. A pessary containing alcoholic extract 2 grs., tannic acid 7 grs. and cacao-butter *q.s.* is very serviceable in **leucorrhœa** with **ulcerated os**. A suppository containing alcoholic extract 1 gr. is an excellent application to relieve the pain of spasmodic and neuralgic **dysmenorrhœa**.

Eye.—A solution of atropine is dropped into the eye to dilate the pupil and paralyse the accommodation in many conditions already noticed in page 162 (which see). Atropine may be used to lessen the irritation of the conjunctiva.

Internally. **Alimentary canal.**—Atropine sometimes checks **mercurial salivation**. In small doses frequently repeated alone or in combination with aconite, belladonna (Tr.) checks **acute tonsillitis**. Its extract is often combined with purgatives either to increase their activity or lessen their griping. As an indirect *aperient*, in very minute doses it may be given in **habitual** or **chronic constipation** and **painful defæcation**. In **obstinate constipation** Trousseau recommends its extract, $\frac{1}{6}$ to $\frac{1}{4}$ gr., night and morning. A suppository containing 1 or 2 grs. of the extract can comfortably move the bowels when strong purgatives have failed. When added to a glycerin suppository it secures a free and easy defæcation.

Alone or with opium the alcoholic extract is very effective in **intestinal obstruction, peritonitis, enteritis** and **appendicitis**. It also relieves the pain of **biliary, intestinal** and **lead colics** by depressing the sensory nerve-terminations and relaxing the involuntary muscular fibres.

Heart and circulation.—Belladonna relieves palpitation, pain and distress of the heart. For this purpose a plaster is often put on the cardiac region. As it increases the action of the heart without lowering its force and relaxes the arterioles, it is of immense value in those cases where we want to empty the ventricles completely, as in **angina**. As an antagonist to the cardio-inhibitory effect of chloroform, atropine may be subcutaneously injected before its inhalation.

Respiratory tract—Belladonna is extremely useful in many spasmodic affections of the air-passages, such as **asthma, spasmodic bronchitis** and **whooping cough**. The writer uses with great benefit the subcutaneous injection of atropine in spasmodic types of asthma. In whooping cough it must be given freely before we may expect any decided improvement In **nasal catarrh** with profuse discharge atropine gives immediate relief. Hausmann recommends its hypodermic injection ($\frac{1}{150}$ gr.) in **hæmoptysis** when ergot fails.

Skin.—Atropine (1 to 2 ms. of the solution, or $\frac{1}{100}$ gr. hypodermically) arrests **excessive sweating**. It is therefore an excellent remedy for **night-sweats of phthisis**.

Nervous system.—Belladonna is now rarely used in nervous diseases. It may be given in **frontal headache** and **sciatica** and is said to control **delirium** in fevers. Touvime recommends atropine in **delirium tremens**. He says that a single hypodermic injection of $\frac{1}{60}$ gr .sometimes calms delirium and brings on a refreshing sleep.

Genito-urinary tract.—It is the only drug which may be of some use in **incontinence of urine** in children. It may stop **nocturnal emissions** in persons whose genitals are weak and relaxed, and discharge takes place without dream or orgasm. It is very useful in allaying the pain and helping the expulsion of **renal calculi**, but in order to obtain these effects it must be given in large doses until toxic action is produced (W. Murray). **Cystitis, dysuria, urethral spasms** and, in fact, any kind of pain in the pelvic organs can be removed by belladonna either administered in the form of a suppository or by the mouth

Antidote to poisons.—Atropine may be successfully used as a physiological antidote in poisoning by morphine, physostigmine, chloroform, aconite, poisonous mushrooms (muscarine), nitro-glycerin, pilocarpine, gelsemine and hydrocyanic acid.

Homatropine hydrobromide acts in the same way as atropine, but its effects are weaker, and it slows the heart's beats, and renders them irregular both in force and rythm. Its mydriatic property is as quick and strong as that of atropine, but it disappears from 12 to 24 hours, while the effect of atropine continues for days.

Prescribing hints.—A porous belladonna plaster is the best to use as it causes less itching and irritation. For application to the female breast, it should be shaped as directed in page 96, or cut in two or three places so as to fit it. Collodion belladonna may be painted over an uneven surface in its stead. Atropine may be given in tablets (see p. 51), pills (see p. 85) or in solution. Hypodermically it is often combined with morphine to counteract its unpleasant physiological effects and to increase its sedative virtue. 10 minims of the tincture every 4 hours to young children for *whooping cough* ; and 30 to 40 ms of the same every 1 or 2 hours during an *attack of renal colic* until atropism—dryness of the throat, dilatation of the pupils and delirium—sets in are not unsafe to use in these particular cases. Ext Bellad. Virid., gr. ¼, and Zinci Oxidi, grs. 3, make an excellent pill for arresting *excessive sweating*, *urticaria* and *acne*. Caustic fixed alkalis destroy the alkaloids of belladonna, but carbonates and bicarbonates of sodium and potassium do not do so.

Homatropine hydrobromide may be applied in solution (4 grs. in 1 oz. of water), as a disc, or sometimes dissolved in castor oil with cocaine, as it is less likely to be washed out by the tears.

BENZOINUM. Benzoin. N.O. *Styraceæ.*

Syn.—Gum Benjamin. **Syn. I.V.**—*Lobán*, Beng. Hind.

Habitat.—Siam and Sumatra.

Source.—A balsamic resin obtained from *Styrax Benzoin* and other species of Styrax. Commercially known as Siam and Sumatra benzoin.

Characters.—*Siam benzoin.*—In flat or curved reddish-brown tears, 2 in. long, ½ in. thick ; milky white internally. *Sumatra benzoin.*—In masses of agglutinated tears, having a white and reddish-brown marbled or mottled or granite-like appearance. Brittle, softens when warm and yields fumes of benzoic acid when heated. Odor agreeable, like vanilla in the case of Siam, and like storax in the case of Sumatra benzoin. *Solubility.*—In alcohol 90 p.c. and solution of potassium hydroxide.

Identification—See Ammoniacum, p. 225.

Composition.—(1) *Benzoic Acid*, 12 to 20 p.c. (2) *Cinnamic Acid* a trace. (3) *Volatile Oil.* (4) *Resins.*

Action.—Expectorant, diuretic.

Enters into.—Adep. Benzoat., Ung. Cetacei and the

OFFICIAL PREPARATION.

1. **Tinctura Benzoini Composita.** *Syn.—Friar's balsam.* **B.P. Dose**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Tr. Benzoini Simplex. B.P.C.**—Benzoin 2, Alcohol 90 p.c. *q.s.* By maceration to 20.

2. **Ung. Benzoini.**—Benzoin 1, Adeps 4. M. In chronic ulcers.
3. **Vapor Benzoini.**—1 dr. in 1 pint, at 140° F. A soothin sedative in bronchial irritation.

ACIDUM BENZOICUM. Benzoicum Acid. C_6H_5,COOH.

Source.—Obtained from benzoin by sublimation. Also from toluene, hippuric acid and other organic compounds. In commerce we find 4 varieties :—(1) *Resin Sublimed Acid*, (2) *Resin Precipitated Acid*, (3) *Hippuric Benzoic Acid* and (4) *Toluene Benzoic Acid.*

Characters.—In light, feathery, colorless and odorless crystalline plates or needles. *Solubility.*—1 in 400 of cold, 1 in 17 of boiling water, 1 in 3 of alcohol 90 p.c., 1 in 7 of chloroform, and in fixed and volatile oils ; also in the solutions of alkalis and of calcium hydroxide. Sodium phosphate or borax aids solubility in water. Volatalises in the vapor of water. *Impurities.*—Hippuric, cinnamic, oxalic and chloro-benzoic acids.

Action.—Antiseptic, stimulating expectorant, diuretic. **B.P. Dose.**—5 to 15 grs.

Enters into.—Tr. Camph. Co., Tr. Opii Ammoniata and the

Official Preparation.

1. **Trochiscus Acidi Benzoici.**—½ gr. in each. *Dose.*—1 to 5.

AMMONII BENZOAS.

Ammonium Benzoate. C_6H_5, COONH$_4$.

Source and **Characters.**—Colorless laminar crystals, prepared by neutralising solution of ammonia with benzoic acid. *Solubility.*—1 in 6 of cold water, 1 in 30 of alcohol 90 p.c. and 1 in 8 of glycerin. *Impurities.*—Free acid, sulphates and chlorides.

Incompatibles.—Ferric salts, acids, liq. potassæ.

Action.—Diuretic. **B.P. Dose.**—5 to 15 grs. in solution.

SODII BENZOAS. Sodium Benzoate. C_6H_5, COONa.

Source and **Characters.**—A white, inodorous, amorphous or crystalline powder with a faint benzoic odor ; prepared by neutralising benzoic acid with sodium carbonate. *Solubility.*—1 in 2 of water, 1 in 24 of alcohol 90 p.c. *Impurities.*—Many metals and salts.

Action.—A powerful hepatic stimulant and diuretic. **B.P. Dose.**—5 to 30 grs. in solution.

Non-Official Derivatives of Benzoic Acid.

1. **Potassii Benzoas.**—A soluble, crystalline salt. In lithic acid diathesis, cystitis. *Dose.*—15 to 30 grs.
2. **Sodii Hippuras.**—A soluble white amorphous powder. A solvent of urates in gout and gravel. *Dose.*—5 to 30 grs.

Pharmacology of Benzoin and Benzoic Acid.

Externally.—Both benzoin and benzoic acid are **antiseptics**, superior to carbolic and salicylic acids (see p. 166). A concentrated solution is a **local stimulant** and **irritant**.

Internally. **Gastro-intestinal canal** and **liver.**—The salts are less irritant and are therefore used in preference to the acid. In small doses they have little effect on the stomach and intestine, but in large doses **irritate** them. They are **hepatic stimulants** increasing both the quantity and solids of the bile. The acid is an **intestinal disinfectant.**

Respiratory tract.—Both the gum and acid cause sneezing when sniffed up. Their vapor directly stimulates the bronchial secretion, which is also remotely stimulated during their excretion when given by the mouth. Hence they are **stimulant expectorants.** They also disinfect the secretion.

Urinary tract.—Benzoic acid and its salts are largely excreted with the urine, partly unchanged, but chiefly as **hippuric acid.** Occasionally succinic acid also appears in the urine. The appearance of hippuric acid in the urine is due to the decomposition of benzoic acid in the presence of glycocoll in the renal cells but not in the blood ; thus,—$C_7H_6O_2$ (benzoic acid)+$C_2H_5NO_2$ (glycocoll)=$C_9H_9NO_3$ (hippuric acid)+H_2O. The origin of glycocoll is not known, but the fact of the conversion of the benzoic acid taking place in the kidneys is proved by the following experiments :—(1) If benzoic acid is given in large doses, it is found unchanged in the blood, but if the renal arteries are tied no hippuric acid is generated, though it is formed if the ureters are tied. (2) Benzoic acid is converted into hippuric acid if the blood containing the former but no glycocoll is slowly passed through the kidneys immediately removed after death. (3) When hippuric acid is given by the mouth, benzoic acid is detected in the blood and hippuric acid in the urine. Hippuric acid thus formed performs most important functions. It **stimulates the activity of the renal cells** and **renders the alkaline urine acid.** Hence benzoic acid and benzoates are **diuretics** and **acidifiers** of alkaline urine. It is said that conversion to hippuric acid does not occur in diseased kidneys. Over the mucous membrane of the tract, they have a soothing, disinfecting and alterative influence.

Temperature.—Benzoic acid and benzoates are **antipyretics,** sometimes acting more powerfully than salicylic acid, but how they act is not known.

Metabolism.—They are believed to increase tissue metamorphosis.

Elimination.—Chiefly with the urine, and partly with the sweat, saliva and bronchial secretion, which are stimulated to a slight extent.

THERAPEUTICS.

Externally.—A piece of lint soaked in Friar's balsam may be used to stop bleeding from and promote the healing of **fresh wounds.** In the same manner it may be used as an effective dressing for **ulcers** of all sorts. Undiluted Friar's balsam injected into **sinuses** establishes a healthier action in these tracts and heals them quickly. Its painting relieves pruritus of **urticaria**, and its solution (5% of the compound tincture with 5% of glycerin in 1 oz. of water) is a soothing stimulant application for the skin after the cure of **acne**. Benzoin is mixed with lard to prevent its decomposition, but it occasionally causes irritation of the skin.

Internally. **Lungs.**—Both benzoin and benzoates are largely employed in chronic **bronchitis** and **phthisis**, particularly if the expectoration is foul and scanty, either by the mouth or by inhalation. The vapor of the tincture has been found to cut short attacks of **catarrh** and **influenza** with surprising rapidity.

Urinary tract.—As an *acidifier* of alkaline decomposing urine in **cystitis, pyelitis** or **phosphatic calculi**, benzoic acid and benzoates are most valuable. We use salts, especially the ammonium benzoate which is more soluble and less irritating, in preference to the acid, as they cause less gastro-intestinal irritation. They may be combined with urinary sedatives, such as tinct. hyoscyam.

Rheumatism and gout.—Benzoic acid may be given in **acute rheumatism** when salicylate of sodium cannot be borne or fails to do good. In **gout** it is occasionally used with the idea that it converts uric acid into hippuric acid and thus helps its elimination.

Prescribing hints.—The acid may be given in cachets, pills, or mixtures suspended by mucilage Chloroform disguises its taste. The vapor may be inhaled through an inhaler or even directly from a bottle.

BENZOL. Benzol.

Source.—A mixture of homologous hydrocarbons obtained from light coal-tar oil. It contains about 70 p c. of benzene C_6H_6, and 20 to 30 p.c. of toluene C_6H_5, CH_3.

Characters.—A colorless, volatile liquid ; odor strong characteristic. Sp. gr. 0·880 to 0·888.

Uses.—It is only used in pharmacy as a solvent for India-rubber.

BERBERIS. Berberis. N.O. *Berberideæ.*

(*Ind. and Col. Addendum.*)

Syn. I. V.—*Dáruharidrá káshta*, Beng. *Dárhald, Chatra*, Hind.

Habitat.—India, Eastern Colonies.

Source.—The dried stem of *Berberis aristata.*

Characters.—Undulating pieces 1 to 2 in. thick, covered with orange-brown periderm. Bright yellow. Odor faint. Taste bitter.

Composition.—Two alkaloids—(1) *Berberine* and (2) *Oxycanthine.*

OFFICIAL PREPARATIONS.

1. **Liquor Berberidis Concentratus.**—Berberis 10 ozs., Alcohol 20 p.c. 25 ozs. or *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

2. **Tinctura Berberidis.**—Berberis 2 ozs., Alcohol 60 p.c *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1 **Ext. Berberidis.**—An impure watery extract from the wood and bark of several species of Berberis sold in the Indian bazars under the name of **Rasot**, which can be purified by dissolving it in alcohol 90 p.c. and evaporating it to a pilular consistence. *Dose.*—30 to 60 grs

2. **Inf. Berberidis.**—1 in 20 of boiling water for 1 hour. *Dose* —1 to 2 ozs.

3 **Berberine Carbonate, Hydrochloride, Phosphate** and **Sulphate** are yellow crystals more or less soluble in water. *Dose.*—1 to 5 grs.

PHARMACOLOGY AND THERAPEUTICS.

Externally —Being a mild **local astringent** *Rasot* is often employed by the natives of India with benefit as a pigment around the eyes in acute and chronic **ophthalmia**. Often it is combined with alum and opium.

Internally.—Berberis is a mild **astringent, bitter tonic** and **stomachic** in small doses, and **diaphoretic, antipyretic, antiperiodic** and gentle but certain **aperient** in large doses. It is chiefly used in fevers. Its diaphoretic and antipyretic properties, according to some authorities, are equal to those of quinine and Warburg's tincture. Dr. W. B. O'shaughnessy speaks very highly of *Rasot* in **intermittent fever**. He says that "in no instance was headache or constipation produced, but we have seen *Rasot* exasperate the symptoms of chronic dysentery and hepatitis when combined with ague." As an alterative tonic, Berberis may be used in **scrofulous** and **syphilitic diseases**, and as an astringent, tonic and alterative in **chronic intestinal catarrh**. It checks vomiting of pregnancy.

BETEL. Betel. N.O. *Piperaceæ.*

(*Ind. and Col. Addendum.*)

Syn I.V.—*Pán*, Beng. *Pán, támbuli*, Hind.

Habitat.—India, Eastern Colonies.

Source.—The leaves of *Piper betle.*

Characters.—Broadly ovate, accuminate, obliquely cordate at base, glossy on upper surface. Taste warm, aromatic, bitter.

Composition.—(1) Two *Aromatic Oils*, light and heavy, which treated with caustic potash yields *chavicol*, a phenol having powerful antiseptic properties (2) An alkaloid *Arakene* with properties somewhat allied to cocaine. The characteristic odor of the leaves and oil is due to "betel-phenol."

PHARMACOLOGY.

Externally.—Dry betel-leaf has no action. Fresh betel-leaf is a gentle **stimulant** to the skin, due no doubt to the volatile oils it contains.

Internally.—When chewed the fresh leaf is a mild, aromatic **sialagogue**, allaying thirst and removing dryness of the mouth. It also removes foulness of mouth and breath. The juice stimulates the gastric vessels and nerves and thus acts as a **stomachic** and **carminative**. It is said to possess mild **astringent** and **expectorant** virtues The warm juice is considered a **febrifuge.** Too much chewing of **pan** blunts hunger probably because of the presence of alkaloid *Arakene.* If taken excessively it may cause intoxication somewhat similar to that of alcohol.

THERAPEUTICS.

Externally.—As an easily available domestic remedy, betel-leaf is used for various purposes. Smeared with mustard oil or *chunam* (hydrated slaked lime) and warmed, it is applied to the temples in **headache**, to the neck in **sore-throat**, to **swollen glands** to promote their absorption and to the breasts to check the secretion of milk. The writer applies the juice mixed with chunam (2 to 1) and warmed in these cases with good results. In catarrhal and pulmonary affections of children, the leaves smeared with oil and warmed are applied in layers to the chest, relieving both cough and dyspnœa. The leaves may be similarly employed in hepatitis, orchitis, ovaritis, &c. The Bengal betel-leaves are most valuable in these cases. They are used as dressings for foul ulcers or as substitutes for oiled silk or gutta-percha tissue. The juice is sometimes dropped into the eye in **ophthalmia** or into the ear (warmed) to relieve earache. The stalk of the leaf smeared with oil is introduced into the rectum in **constipation** and flatulence of chidren.

Internally.—The natives of India chew prepared *pan*, which is made by wrapping slices of areca nut with a proportionate quantity of catechu, chunam and spices in betel leaves. This combination is very efficacious in **ulcerated** and **spongy gums**, and as a digestive adjuvant in **dyspepsia**. Prepared *pan* is an excellent masticatory for removing the after-taste of bitter and nauseous drugs, and dryness of the mouth in Bright's disease and diabetes. The juice may be given as an expectorant in colds and coughs or as a febrifuge in **catarrhal fever** of children. The slender roots of the plant are said to cause sterility in woman.

BISMUTHI CARBONAS. Bismuth Oxycarbonate.

$(Bi_2O_2CO_3)_2, H_2O$.

Source.—May be prepared by the interaction of bismuth nitrate and ammonium carbonate (Bismuth nitrate is not official).

Characters.—A heavy whitish powder insoluble in water, soluble in nitric acid and water. *Impurities.*—The same as those of the subnitrate.

Action.—Antacid, gastric sedative. **B.P. Dose.**—5 to 10 grs.

Official Preparation.

1. **Trochiscus Bismuthi Compositus.**—*Dose.*—1 to 6.

BISMUTHI OXIDUM. Bismuth Oxide. Bi_2O_3.

Source.—Prepared by boiling bismuth oxynitrate with solution of sodium hydroxide. $2BiONO_3+2NaHO=Bi_2O_3+2NaNO_3+H_2O$.

Characters.—A slightly brownish-yellow powder insoluble in water, but soluble in nitric acid mixed with half the volume of water. *Impurities.*—The same as those of the subnitrate.

Action.—Similar to the subnitrate. **B.P. Dose.**—5 to 20 grs.

Non-Official Preparations.

1. **Bismuthi Oxidum Hydratum.**—A white amorphous powder which mixes readily with water to form **Bismuth Cream** (1 in 4).

2. **Ung. Bismuthi Oxidum.**—Bismuth Oxide 1, Oleic Acid 8, White Wax 3, Soft Paraffin 9. Mix by the aid of heat.

BISMUTHI SALICYLAS. Bismuth Salicylate.

$C_6H_4\cdot OH\cdot COO\cdot BiO$.

Source.—May be prepared by the interaction of bismuth nitrate and sodium salicylate.

Characters.—A white, heavy, amorphous powder insoluble in water and alcohol 90 p.c. *Impurities.*—The same as those of the bismuth subnitrate.

Action.—Gastro-intestinal sedative, antiseptic. **B.P. Dose.**—5 to 20 grs.

Non-Official Derivatives.

1. **Bismuthi et Cerii Salicylas.**—A double salt useful in sea-sickness, diarrhœa, dysentery and ulcerated bowels. *Dose.*—5 to 20 grs.

2. **Thioform.** *Syn.—Basic Dithio-Salicylate of Bismuth.*—An antiseptic desiccant.

BISMUTHI SUBNITRAS. Bismuthi Oxynitrate.

$BiONO_3,H_2O$.

Source.—Prepared by the interaction of bismuth nitrate and water. $5(Bi3NO_3)+8H_2O=4(BiONO_3H_2O)+2NO+4H_2O$.

Characters.—A heavy, white, inodorous powder consisting of minute crystalline scales ; reaction slightly acid. *Solubility.*—Insoluble in water. *Impurities.*—Nitrates, chlorides, tellurium, arsenic, lead.

Incompatibles.—Alkaline carbonates, potassium iodide.

Action.—Sedative, astringent both externally and internally. **B.P. Dose.**—5 to 20 grs.

Official Preparation.

1. **Liquor Bismuthi et Ammonii Citratis.** *Syn. B.P.—Liquor Bismuthi.*—3 grs. of Bismuth Oxide in 1 dr. A colorless, neutral or slightly alkaline solution with a metallic taste. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Liq. Bismuthi Conc. B.P.C.**—Dose.—15 to 30 ms.

2. **Mist. Bismuth. Comp. B.P.C.**—Morph. Hyd. 8 grs., Water 4 drs.; dissolve and add Tr. Card. Co. 3 ozs., Chloroform 70 ms, Ext. Nux. Vom. Liq. 135 ms., Acid Hydrocyan. Dil. 320 ms.; mix and add Liqr. Bismuth. Conc. B.P.C. 15 ozs. and water to 1 pint. *Dose.*—20 to 30 ms.

3. **Pulv. Bismuthi Co.** *Syn.—Ferrier's Snuff.*—Bis. Subnitrate 6 drs., Morph. Hyd. 2 grs., Powdered Acacia Gum 2 drs. Mix. Useful in coryza. A pinch each time till the nostrils are cleared.

4. **Lotio Bismuthi. B.S.H.**—Subnitrate 10 grs., water 1 oz. A sedative lotion in eczema.

5. **Ung. Bismuthi.**—Subnitrate 1 in lard 8.

ADDITIONAL DERIVATIVES OF BISMUTH.

1. **Bismuthi Albuminate.** *Dose.*—20 to 60 grs.

2. **Bis. Beta-Naphtholate.** *Syn.—Orphol.*—Less irritating than naphthol. A gastro-intestinal antiseptic and astringent. *Dose.*—10 to 30 grs.

3. **Bis. Benzoate.** *Syn.—Bis. Oxybenzoate.*—A white, inpalpable, antiseptic powder used for stimulating indolent ulcers and chancres. *Dose.*—5 to 20 grs.

4. **Bis. Citrate.**—A white powder slightly soluble in water. *Dose.*—2 to 5 grs.

5. **Bis. Lactate.**—Useful in gastrodynia. *Dose.*—5 to 20 grs.

6. **Bis. Loretinate.**—Dusted on ulcers or wounds like iodoform. Internally in phthisical diarrhœa. *Dose.*—5 to 10 grs.

7. **Bis. Naphthalin-benzoate.** *Syn.—Intestin.*—Acts like Orphol.

8. **Bis. Oleate.**—A bland non-irritating demulcent

9. **Bis. Oxychloride.**—Inpalpable non-irritating powder, used as a cosmetic and as a sedative coating in irritable conditions of the mouth, throat, vagina and rectum. *Dose.*—5 to 20 grs.

10. **Bis. Oxyiodide.**—A brownish, red, amorphous powder insoluble in water. Used like iodoform. *Dose.*—5 to 10 grs.

11. **Bis. Oxyiodogallate.** *Syn.—Airol.*—A greyish-green powder used as a substitute for iodoform, and injected as an emulsion with glycerin (10 p. c.) in gonorrhœa.

12. **Bis. Oxybromide.**—A yellowish fine powder. Used in hysterical dyspepsia with gastric pains and vomiting. *Dose.*—10 to 15 grs.

13. **Bis. Peptonate.**—A brown powder containing 3½ p.c. of bismuth oxide. Very easily assimilable. *Dose.*—1 dr.

14. **Bis. Phosphate.**—A soluble white powder, in acute gastric and intestinal catarrh. *Dose.*—80 grs. daily.

15. **Bis. Pyrogallate.** *Syn.—Helcosol.*—A yellow powder soluble in alkaline secretions. Used as an antiseptic in skin diseases.

16. **Bis. Phenolate.**—A greyish neutral powder, may be used as a substitute for iodoform and as an intestinal antiseptic. *Dose.*—15 grs.

17. **Bis. Sulphocarbolate.**—An intestinal antiseptic. *Dose.*—4 to 8 grs.

18. **Bis. Sodium-phosph.-salicylate.** *Syn.—Bismuthol.*—A white powder, may be used like iodoform combined with talc (1 in 5).

19. **Bis. Methylen-digallate.** *Syn.—Bismal.*—May be sprinkled over ulcers and intertrigoes and given in tubercular diarrhœa. *Dose.*—10 to 15 grs.

20. **Bis. Subgallate.** *Syn.—Dermatol.*—A yellow, odorless, non-irritating and non-poisonous powder, superior to iodoform as a dressing in ulcers, burns, wounds, chancres, eczema, &c. It may be applied as a paste, powder, collodion, glue or ointment. Found invaluable in tubercular diarrhœa. Has been used also in gastric ulcer and cancer. *Dose.*—30 to 90 grs. daily.

21. **Bis. Resorcinate.**—A yellowish powder, may be used as a substitute for iodoform.

22. **Bis. Iodo-Resorcin-Sulphonate.** *Syn.—Anusol.*—In piles as a suppository.

23. **Eudoxin.**—A *bismuth salt of tetraiodophenolphthalein* (nosophen) in reddish-brown insoluble powder, used in tubercular ulceration of the bowels in 15 gr. doses, and in enteritis of children in 2 to 4 grs. Externally like iodoform.

24. **Erythrol.**—A double iodide of bismuth and cinchonidine. Useful in butyric acid dyspepsia. *Dose.*—$\frac{1}{7}$ to $\frac{3}{4}$ gr.

PHARMACOLOGY OF BISMUTH SALTS.

Externally.—Bismuth salts have no action on the unbroken skin, but on the denuded surface they act as a **sedative,** mild **astringent** and **antiseptic.**

Internally. **Gastro-intestinal tract.**—Bismuth salts blacken the tongue, have no taste and produce a feeling of roughness in the mouth. The sparingly soluble salts in large doses and the soluble salts in small doses act as direct **sedatives** to the mucous membrane of the stomach and intestine. How they act either by mechanically shielding the nerve-terminations from the irritating secretions, or by altering the composition of the secretions or by modifying the circulation, is not known. As a consequence of this sedative effect, they act as **antiemetics** and **mild astringents.** They also control fermentation, especially the salicylate, sulphocarbolate, phenolate, &c., and are therefore **intestinal antiseptics.** Bismuth subnitrate splits up into bismuth oxide and nitric acid in water, liberating nitrous gas which tends to contribute towards the antiseptic property of the drug. In moderate doses bismuth acts in the same manner as small doses of arsenic, 1 dr. of liq. bismuthi being equal to $\frac{1}{2}$m. of liq. arsenicalis. In large doses it produces **gastro-intestinal irritation** like arsenic or antimony though not so powerfully. It is passed off in the fæces as a sulphide, coloring them leaden black.

Remote action.—Bismuth salts are slowly absorbed. We know little of their remote action. According to some authorities they are carriers of oxygen like arsenic, especially the oxide. But this is a fact, that soluble salts when continued long produce fatty degeneration of the liver like phosphorus and arsenic. But how far these effects are due to arsenic as an impurity in the drug is not easy to say. Sometimes we observe a purplish line on the gums and an onion-like smell in the breath. The latter is believed to be caused by traces of tellurium—also an impurity in the bismuth preparations.

Elimination.—Bismuth is eliminated in the intestinal secretion, urine and milk. A portion is deposited in the liver, spleen, kidneys and nervous system.

THERAPEUTICS OF BISMUTH SALTS.

Externally.—Bismuth is a **cosmetic,** the oxychloride is preferred for this purpose, as it can be reduced to finest powder. Persons using this cosmetic should avoid sulphuretted hydrogen which chemically acts on the metal and makes the face leaden black. As a *local sedative*, *astringent* and *antiseptic*, bismuth may be applied in the form of powder, lotion or ointment to **chapped hands** and **nipples, irritable ulcers, intertrigoes, herpes, eczemas,** &c. In weeping eczema the writer uses the subnitrate and oxide of zinc in equal parts as a dusting powder after painting the red areola with a silver solution (see p. 250). Bismuth salicylate, dermatol and many non-official derivatives may be used as substitutes for iodoform. Ferrier's snuff wonderfully checks **coryza** and **chronic nasal catarrh**. Bismuth subnitrate (60 grs. to water 1 oz. suspended by mucilage or glycerin) may be used as an injection in **gonorrhœa** or **leucorrhœa,** and as a pessary (oxy chloride 10 grs.) in irritable conditions of the cervix and os.

Internally.—As a *gastric sedative* bismuth salts are remarkably efficacious in all **irritable** and **painful gastric disorders,** such as catarrh, vomiting, indigestion, gastrodynia, pyrosis and ulcers, simple and malignant. The only drawback to their use is that they cause constipation in cases where we want to avoid it. If the pain is intense they may be combined with morphine, and if the gastric irritability is great with hydrocyanic acid dilute.

As an *intestinal sedative* and *astringent* they are largely employed in all forms of **diarrhœa,** acute or chronic, either in children or adults. The salicylate is a useful remedy for children's diarrhœa due to the decomposition of food, because it has the properties of both bismuth and salicylic acid. Occasionally it may with advantage be combined with the grey powder. It has also been found greatly useful in **summer, tubercular, enteric** and **lienteric diarrhœa** and **cholera**. The bismuth salts are most effective medicines in **mucus diarrhœa** and **dysentery.** In the last disease they may be given with ipecacuanha in the acute stage or with Dover's powder to check the after diarrhœa.

Prescribing hints—As the less soluble preparations allay irritation better than the soluble ones, they are to be preferred when the gastric or intestinal irritability is a prominent symptom. For this purpose we use either the carbonate or the subnitrate. If they are given in a mixture they should be suspended by the compound tragacanth powder, and not by the mucilage of acacia, as the latter may convert the mixture into a jelly-like mass. Again the subnitrate should not be combined with any alkaline carbonates, for bismuth oxynitrate slowly parts with nitric acid in water and gives off carbonic acid (see p. 81), but this objection does not apply to the carbonate. They should not also be mixed with iodides (see p. 81). Liq. bismuth. ammon. citratis is more astringent and irritant than the carbonate, subnitrate and oxide, and may be given with acids or alkalis. The Royal College of Physicians in 1892 recommended the following **anti-choleraic mixture**:—Bis. et Cerii Salicylas 5 grs., Pulv. Cinnamom. Co. 7½ grs., Tr. Camph. Co. 30 ms., Tr. Chlorof. Co., Sp. Ammon. Arom. *aa* 20 ms., Essen. menth. pip. 10 ms., Mist Crete *ad* 1 oz. *Dose.*—1 oz. every 2 to 4 hours.

BORAX. See page 178.

BROMUM. Bromine. Br. *(Non-official.)*

Source and **characters.**—A liquid non-metallic element obtained from sea-water and saline springs. From it are prepared—

AMMONII BROMIDUM. Ammonium Bromide. NH_4Br.

Source.—Formed by neutralising hydrobromic acid with solution of ammonia. $HBr + NH_4HO = NH_4Br + H_2O$.

Characters.—In small, colorless crystals; taste pungent saline. *Solubility.*—1 in 1½ of water, 1 in 15 of alcohol 90 p. c. *Impurities.*—Bromates, iodides, nitrates, lead, iron.

Action.—Nervine sedative, hypnotic. **B.P. Dose.**—5 to 30 grs.

POTASSII BROMIDUM. Potassium Bromide. KBr.

Source.—May be obtained by adding a slight excess of bromine to a strong solution of potassium hydroxide, evaporating the solution of potassium bromide and bromate to dryness, decomposing the bromate by fusing the mixture with charcoal and purifying by crystallisation.

Characters.—In colorless cubical crystals; taste pungent saline. *Solubility.*—1 in 2 of water, 1 in 200 of alcohol 90 p.c. *Impurities.*—Lead, iron, copper, arsenium, aluminium, zinc, calcium, magnesium, sodium, ammonium, bromates, iodates, cyanides, &c.

Identification.—Crystals of potassium bromide resemble those of *potassium iodide* which are larger and more distinctly cubical, but this is not invariably the case. Chemical tests are the safest guide.

Incompatibles.—Solutions containing free chlorine or free acids, spirit of nitrous ether if acid.

Action.—The same as above. **B.P. Dose.**—5 to 30 grs.

Enters into.—The preparation of Acid. Hydrobrom. Dil.

SODII BROMIDUM. Sodium Bromidum. NaBr.

Source.—Prepared in the same manner as potassium bromide.

Characters.—In small white cubic crystals, somewhat deliquescent, inodorous; taste saline. *Solubility.*—1 in less than 2 of water, 1 in 16 of alcohol 90 p.c. *Impurities.*—The same as of potassium bromide.

Incompatibles.—The same as of potassium bromide.

Action.—Similar to Ammon. Bromide. **B. P. Dose.**—5 to 30 grs.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Ethyl Bromide.**—A colorless volatile liquid with a peculiar odor and sweetish warm taste. Used as an anæsthetic particularly in America.

2. **Lithium Bromide.**—A white granular deliquescent salt containing bromine 91·95 p.c. Useful in Bright's disease. *Dose.*—5 to 15 grs.

3. **Rubidium Bromide.**—In white crystals. *Dose.*—5 to 30 grs.

4. **Rubidium Ammonium Bromide.**—In white granular crystals more powerful than potassium bromide in epilepsy. *Dose.*—90 grs. daily.

5. **Strontium Bromide.**—In deliquescent, acicular crystals. Better borne than potassium bromide. *Dose.*—5 to 30 grs.

6. **Bromalin.** *Syn.—Brom-ethyl-formin.*—Colorless scales soluble in water. A nervine sedative without producing skin eruptions. *Dose.*—10 to 30 grs.

7. **Bromidia.** *Syn.—Liq. Bromo-Chloral Comp. B.P.C.*—1 dr. contains 10 grs. of each of Chloral Hydrate and Pot. Bromide. Chloral. Hydrate 1,600 grs., Tr. Cannab. Ind. 400 ms., Tr. Aurant. 400 ms., Suc. Hyoscyam. 1,600 ms., Syrup 3¾ ozs., Ex. Glycir. Liq. ½ oz. Dissolve and add Pot. Bromide. 1,600 grs. dissolved in 7 ozs. of water. Filter, and add water to 20 ozs. *Dose.*—½ to 2 drs.

8. **Bromoform.**—A colorless, volatile, sweet liquid with an agreeable odor, soluble in chloroform, ether and slightly in water. Most efficacious in whooping cough, diminishing the number, duration, severity and vomiting. *Dose.*—2 to 5 ms., ½ to 1 m. for a child 1 year old.

10. **Bromipin.**—An yellow oily liquid prepared by interacting bromine with sesame oil (*til oil*). An easily absorbent organic preparation of bromide very useful in epilepsy and neurosis. *Dose.*—1 to 4 drs. in emulsion or hydro-alcoholic solution.

11. **Bromo-Hemol.**—A compound of bromine with hæmoglobin in brown powder. Recommended in hysteria of anæmic subjects. *Dose.*—15 to 30 grs.

12. **Liq. Arsenici Bromatus.**—See p. 174.

13. **Liq. Auri et Arsenii Bromidi**—See p. 174.

PHARMACOLOGY OF BROMIDES.

Externally.—Bromine like chlorine and iodine destroys enzymes and organised ferments and is therefore a **disinfectant** and **deodorant**. Applied to the skin it acts as an **irritant** and **caustic**. Bromides have no action on the unbroken skin, but on the denuded surface a concentrated solution acts as an **irritant**. The fumes of bromine are so irritating to the respiratory tract that they cannot be inhaled.

Internally. **Alimentary canal.**—Either in concentrated solution applied to the throat or in repeated large doses given by the mouth, bromides **diminish** the **sensibility** and the **reflex excitability** of the fauces. The touching the pharynx then no longer tends to excite vomiting even though the sensation of touch may be felt. The bromides are readily absorbed by the gastro-intestinal mucous membrane, and according to some authorities they are converted into sodium bromide before absorption. They appear to have no influence on the stomach.

Heart and circulation.—Some believe that bromides are only changed into the sodium salt in the blood. But this is a fact that they circulate as sodium bromide, and pass through the different organs as such. Bromides, particularly the potassium bromide, act as **direct sedatives to the heart diminishing its force and frequency** by its paralysing influence on the heart substance, and not through the cardio-inhibitory centre. In toxic doses the heart's action is arrested in diastole. It is yet to be settled how far bromides can contract the blood-vessels.

Respiration is only slightly depressed probably through their influence on the circulation.

Temperature is also depressed only by toxic doses, probably by the depressed condition of the circulation.

Nervous system—The chief action of bromides is on the entire **nervous system** which is **powerfully depressed.** In their progressive action on this system, they follow the "Law of Dissolution" (see p. 158), *i.e.*, the highly-developed functions are affected first, then the lower and lastly the spinal ones.

Cerebrum.—All bromides **lessen the functional activity of the brain.** The sensibility, excitability and emotional activity are all diminished, thereby inducing a state most favourable for sleep. Hence they are **hypnotics** (see p. 159). It is not definitely known whether they act on the nerve-cells or on the circulation. They also depress the **cortical motor area** (see p. 160), and in excessive doses cause degeneration of the cortical cells beginning at the ends of the dendrons.

Medulla and cord.—The great vital centres are more or less depressed. There is a considerable **impairment** of the **reflex excitability** induced by the depressed condition of the peripheral sensory nerves and chiefly by the diminished excitability of the nerve-centres.

In brief, bromides depress (1) the cortical motor cells, (2) the medullary and spinal centres, (3) the reflex excitability in connection with all the sentient surfaces of the body, (4) the activity of the sensory mechanism, and (5) that of the peripheral nerves.

Muscles.—The bromides not only **impair the activity** of the muscles by their action on the motor cells and reflex centres, but by their direct influence on the muscles themselves. They may be depressed to such an extent that no convulsions can be produced by poisoning with strychnine. Therefore they are powerful **antispasmodics.**

Metabolism.—Large doses affect metabolic activity by reducing the exhalation of carbonic acid. The amount of urine as well as its coloring and nitrogenous matters and sulphur are increased, while phosphorus is decreased.

Genitals.—Bromides decidedly lessen the sexual strength, and if continued long the sexual passion. Hence they are **anaphrodisiacs.** The irritability of the ovaries and uterus is also diminished.

Elimination.—Bromides are soon eliminated chiefly by the kidneys, intestinal and bronchial mucous membrane, skin, saliva and milk. Many think that they depress the sensibility of the fauces during their excretion through its mucous membrane.

Acute toxic action.—Acute poisoning is rare. But if ½ to 1 oz. is swallowed, great weakness, frontal headache, reduction of pulse-rate, irregular pulse, insensibility, aphasia, amnesia are the chief symptoms. Recovery taking place as a rule unless œdema of the lungs sets in.

Chronic toxic action or "Bromism."—A group of symptoms following a prolonged use of bromides is known by the name of "bromism." They are an eruption resembling acne which may lead to boils, chiefly on the face and back, mental dulness, anæmia, general prostration, muscular weakness, imperfect articulation, staggering gait, drowsiness and inclination to sleep, lowering of cutaneous sensibility, abolition of reflex action of the pharynx, conjunctivitis, slight increase of bronchial secretion and impairment of sexual powers. The mental faculties may be so much depressed in bad cases, that melancholia, dementia or other mental disorders may follow.

Antidotes.—The mere stoppage of bromides is enough in the early stage, but by administering an extra quantity of common salt (sodium chloride) with food, the effects may be driven out from the system.

Physiological antagonists.—Strychnine and atropine.

THERAPEUTICS OF BROMIDES.

Internally. **Alimentary canal.**—Before cocaine was known, a solution of potassium bromide was painted several times on the back of the throat before laryngoscopic examination. Bromides are very useful in **reflex vomiting,** such as vomiting of pregnancy, sea-sickness and vomiting occasioned by nervous disorders. Ringer recommends them in the **spasmodic intestinal colic** of children.

Nervous system.—As a *hypnotic* bromides are very efficacious in **sleeplessness** caused by worry, overwork or mental strain. In **delirium tremens, mania, acute inflammatory or febrile diseases, cerebral congestion, night-scream-**

ing of children, **nightmare** of children and adults, bromides may be used with the greatest benefit either to induce sleep or to allay irritability. As a *soother of excitability* bromides are very effective in many **nervous headaches, irritability** of **temper** especially of gouty persons, **nervous excitability** of females either during the latter months of pregnancy or the change of life, **hysteria, hypochondriasis**, &c. According to Brunton the recurrence of headache in the morning in many cases may be prevented by giving 20 to 30 grs. of bromide with 10 to 15 grs. of sodium salicylate at night, repeated once or twice next morning, if it is not entirely checked. As a *muscular and spinal depressant*, they are considered very valuable in all forms of **convulsive diseases**, such as epilepsy, infantile convulsions, puerperal eclampsia, convulsions of Bright's disease or of uræmia, hysteria, chorea, tetanus, &c. In **epilepsy** their efficacy is most marked in *grand mal*, producing little or no effect in *petit mal*. But in order to obtain the full benefit of bromides, they should be continued with occasional interruptions for one to three or more years. Even then we cannot be confident of a permanent cure. Indiscriminate prolonged use sometimes damages the mental faculties.

Bromides are of special value in many convulsive diseases of the respiratory organs, such as **whooping cough, asthma, spasmodic bronchitis, laryngismus stridulus** and **acute laryngitis**. In the last two, they must be given in large doses. In whooping cough the ammonium bromide is considered more efficacious.

In short, any convulsive disease, whether centric or excentric, can be treated with bromides. The writer found excellent results in cases of sudden and painful cramps of the muscles of the leg, especially those of the calf, occurring during sleep or more frequently towards morning, when an attempt is made to turn to the side or to sit up.

Heart.—In some **nervous disorders** of the heart due either to dyspepsia, hysteria or alcoholism, sodium or ammonium bromide is of great use.

Genital organs.—Potassium bromide is a very valuable anaphrodisiac in **nymphomania, satyriasis** and **priapism**. Many cases of **nocturnal emission** yield to it. It checks **menorrhagia** due to ovarian irritation, **ovaritis** and **ovarian neuralgia**.

Glands.—Potassium bromide may be given to reduce **enlarged glands** and **syphilides** in cases where iodides cannot be borne. Sometimes it is employed to reduce enlarged liver and spleen. It is of no use in diabetes.

Potassium bromide may be used to *lessen* the *disagreeable effects* of opium, quinine, salicin and salicylates.

Caution.—Bromides should be avoided in cardiac and nervous weakness, senile softening of the brain, and gastro-intestinal irritation.

Prescribing hints.—Bromides may be administered by the mouth, rectum or hypodermically. By the mouth in the form of lozenge, tablet or mixture. Their taste is pretty well disguised by the liquid extract of liquorice, milk or beer. For an enema they may be dissolved in gruel or mucilage, and for a hypodermic injection in water (6 grs. in 1 dr.). Their efficacy is greatly enhanced if potassium, sodium and ammonium bromides are given in combination, and the patient is kept more on vegetable food. Of the three salts, sodium and ammonium bromides are not depressant to the heart. To prevent acneform eruption they may be combined with small doses of arsenic. The hypnotic effect of the bromides may be greatly increased if they are given with chloral hydrate, morphine or hyoscyamus. In some cases of *insomnia* bromidia may be used with great advantage. Children and anæmic persons cannot bear a protracted course of bromide treatment. In *whooping cough* bromoform may sometimes do more good than ammonium bromide.

BUCHU FOLIA. Buchu Leaves. N.O. *Rutaceæ.*

Syn.—Bucco, Diosma.

Habitat.—Cape of Good Hope.

Source.—The dried leaves of *Barosma betulina.*

Characters.—From ½ to ¾ in. long, dull yellowish-green, rhomboid ovate, glabrous, somewhat warty, margin denticulate, apex blunt recurved, with visible oil glands. Odor and taste characteristic. *Impurity.*—Leaves of *Emplanum serrulatum* which have no glands.

Identification.—Resemble *Senna* and *Uva Ursi* which are entire.

Composition.—(1) A *Volatile Oil* in the glands containing barosma camphor which deposits on exposure. (2) A *Bitter Principle.* (3) *Mucilage.*

Action.—A stimulating diuretic.

OFFICIAL PREPARATIONS.

1. **Infusum Buchu.**—1 in 20. ¼ hour. **B.P. Dose.**—1 to 2 ozs.
2. **Tinctura Buchu.**—1 in 5. **B P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Internally.—The action of buchu is due to the volatile oil and the bitter principle which it contains In medicinal doses it causes a sensation of warmth in the stomach, and in large doses nausea and vomiting. The volatile oil is readily absorbed in the blood and is mostly excreted by the kidneys which it stimulates, and partly by the bronchial mucous membrane which is also gently stimulated. Hence, buchu is a stimulating **diuretic** and a mild **expectorant.** During its elimination it soothes and disinfects the urinary passages and imparts a peculiar odor to the urine.

THERAPEUTICS.

Internally.—Buchu is chiefly used to allay the irritability of the urinary tract especially the bladder, and is therefore very serviceable in **cystitis**, **irritability** of the **bladder**, **urethritis**, **gonorrhœa**, **pyelitis**, &c. Sometimes it is given in **chronic bronchitis**. If continued too long in large doses, it may harm the kidneys. Brunton says that buchu is given in 20 gr. doses in diarrhœa and dysentery in South Africa.

Prescribing hints.—The infusion makes a good vehicle for diuretics, but the tincture contains more oil and therefore does not mix well with water. As its action resembles that of pareira and uvæ ursi it may be combined with them with benefit.

BUTEÆ GUMMI. Butea Gum. N.O. *Liguminoseæ-*

(*Ind. and Col. Addendum.*)

Syn. B.P.—Bengal Kino. **Syn. I.V.**—*Palás Gand*, Beng. Hind.

Habitat.—India, Eastern Colonies.

Source.—Inspissated juice obtained from incisions in the stem of *Butea frondosa.*

Characters.—In small, irregular, shining fragments of a dark ruby color; inodorous; taste astringent. *Solubility.*—Partially in water. *Impurities.*—Corky and woody particles.

PHARMACOLOGY AND THERAPEUTICS.

The Bengal kino may be employed in making the official preparations for which the B.P. kino is used in India and Eastern Colonies. Its actions and uses are similar to those of the B.P. kino.

BUTEÆ SEMINA. Butea Seeds.

Source.—The seeds of *Butea frondosa.*

Characters.—Flat, reniform, 1 to 1½ in. long, ¾ to 1 in. wide, $\frac{1}{16}$ to $\frac{1}{12}$ in. thick, Testa thin, glossy, wrinkled, reddish-brown. Hilum large, prominent Odor faint. Taste slightly acrid.

OFFICIAL PREPARATION.

1. **Pulvis Buteæ Seminum.**—The kernel dried and powdered freed from the testa after soaking in water. **B.P. Dose.**—10 to 20 grs.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The seeds made into a paste with lime juice act as a **rubefacient** and may be used in **ringworm**. The leaves as a poultice may be used to disperse boils, pimples, buboes and hæmorrhoids.

Internally.—The seeds are a powerful **anthelmintic** for **round worm** and may be used as a substitute for santonin, followed as usual by a dose of castor oil.

The flowers yield a fine yellow dye, and the charcoal of the wood is used for bleaching morphine at the Gazipur factory.

BUTYL-CHLORAL HYDRAS. Butyl-Chloral Hydrate.

$CH_3 \cdot CHCl \cdot CCl_2 \cdot CH(OH)_2$.

Syn.—Croton-Chloral Hydrate, Trichlorbutylidene Glycol.

Source.—Obtained by the addition of water to the liquid butyl-chloral produced by the action of chlorine gas on aldehyde.

Characters.—In pearly white, trimetric laminæ, having a pungent but not acrid odor and an acrid nauseous taste. *Solubility.*—1 in 50 of water, 1 in 1 of glycerin, and alcohol 90 p. c., 1 in 20 of olive oil.

Incompatibles.—Alkalis, antipyrin.

Action.—Analgesic. **B.P. Dose.**—5 to 20 grs. *Daily Dose.*—64 grs.

NON-OFFICIAL PREPARATIONS.

1. **Mistura Butyl-Chloral.**—Butyl-Chloral Hydrate 4 grs., Glycerin 15 ms., Chloroform Water to 1 oz.
2. **Pilula Butyl-Chloral. L.H.**—Butyl-Chloral Hydrate 4 grs., Compound Tragacanth Powder 1 gr. Water *q.s.* For 1 pill.
3. **Syrupus Butyl-Chloral. B.P.C.**—Butyl-Chloral Hydrate 320 grs., Syrup to 1 pint. Dissolve in hot syrup. *Dose.*—1 to 4 drs.

PHARMACOLOGY.

The action of butyl-chloral hydrate is very much identical with that of chloral hydrate though not so powerful. The differential actions of these two drugs will be better understood by reference to the following table :—

Butyl-Chloral Hydrate.	**Chloral Hydrate.**
1. A feeble local anæsthetic.	A powerful local irritant and vesicant in a concentrated solution.
2. A less certain, a less rapid and a less powerful hypnotic.	A more certain, a more rapid and a more powerful hypnotic.
3. A less depressant to the heart.	A more depressant to the heart.
4. An anæsthetic of the fifth nerve and the regions supplied by it.	*Nil.*
5. A less powerful general analgesic.	A more powerful general analgesic, but inferior to morphine or belladonna.
6. A less chance of being poisoned, and greater chance of recovery.	A greater chance of being poisoned and a less chance of recovery.

THERAPEUTICS.

Externally.—Butyl-Chloral hydrate is sometimes locally applied in combination with menthol to annul the pain of a **carious tooth.**

Internally.—As a *hypnotic* it is seldom used except in **insomnia** with **cardiac weakness**, where chloral hydrate is contra-indicated. Its chief use is in the **neuralgia** of the **fifth nerve**, *i.e.*, of the face and a portion of the scalp. According to Ringer it is useful in nearly all neuralgic conditions of the face, occiput, neck and in **migraine**. It has been used with doubtful success in dysmenorrhœa and neuralgia of the limbs.

Prescribing hints.—It is best given in pill which should be made fresh. Syrup of tolu, glycerin and almond mixture fairly cover its taste. In *neuralgia* it is better to give the first dose 10 grs. and then 5 grs. every two hours until the pain is relieved.

CADINUM OLEUM. Oil of Cade. N.O. *Coniferæ*.

Syn. B.P.—Juniper Tar Oil, Huile de Cade.

Habitat.—Southern Europe.

Source.—An empyreumatic oily liquid obtained by the destructive distillation of the woody portions of *Juniperus Oxycedrus*, and some other species.

Characters.—A dark-reddish-brown, viscid, oily liquid. Odor empyreumatic. Taste aromatic, bitter, acrid. Sp. gr. 0·990. *Solubility.*—Freely in chloroform and ether, partially in alcohol 90 p.c. and slightly in water.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The oil of cade resembles tar in its action, but has a more pleasant odor. It may be used in **chronic inveterate eczema, psoriasis** and other skin diseases attended with itching. It is given in the shape of an ointment combined with vaseline or simple cerate, or in a liquid form (oil of cade 1, soft soap 4, alcohol 90 p.c. 4.).

CAFFEINA. Caffeine. $C_8H_{10}N_4O_2, H_2O$.

Syn. B.P.—Theine.

Habitat.—China, Japan, Upper India, Ceylon.

Source.—An alkaloid obtained from the dried leaves of tea—*Camellia Thea* (N.O. *Ternstrœmiaceæ*), or the dried seeds of coffee—*Coffea Arabica* (N. O. *Rubiaceæ*).

Tea yields 3 p.c., coffee seeds 1 p.c., guarana 5 p.c., *mate'* or Paraguay tea 0.5 p.c., kola nut 3 p.c. Caffeine may be synthetically prepared from xanthine.

Characters.—Colorless, silky, acicular, inodorous crystals. *Solubility.*—1 in 80 of cold, and easily in boiling water, alcohol and chloroform. The aqueous solution is neutral.

Incompatibles.—Tannic acid, potassium iodide and mercurial salts.

Action.—Cardiac tonic, diuretic. **B.P. Dose.**—1 to 5 grs.

CAFFEINÆ CITRAS. Caffeine Citrate. $C_8H_{10}N_4O_2, C_6H_8O_7$.

Source.—An unstable compound prepared from caffeine and citric acid (1 in 1).

Characters.—White, inodorous powder with an acid and slightly bitter taste. *Solubility.*—1 in 32 of water.

Action.—The same as that of caffeine. **B.P. Dose.**—2 to 10 grs.

OFFICIAL PREPARATION.

1. **Caffeinæ Citras Effervescens.**—1 in 25. **B.P. Dose.**—60 to 120 grs.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES OF CAFFEINE.

1. **Caffeinæ Ammonio Citras.**—White crystals slightly soluble in water. *Dose.*—1 to 10 grs.
2. **Caff. Hydrobromid.**—Transparent crystals. *Dose.*—1 to 4 grs.
3. **Caff. Hydrobrom. Efferv. B.P.C.**—*Dose.*—60 to 120 grs.
4. **Caff. Sodio-Salicylas.**—A white amorphous powder soluble in water, chiefly used for hypodermic injection. *Dose.*—1 to 4 grs.
5. **Caff. Chloral.**—White granular crystals soluble in water. Analgesic and laxative. In sciatica, rheumatism, constipation, &c. *Dose.*—3 to 8 grs.
6. **Caff. Iodides**—3 varieties,—*hydriodate*, *hydriodide* and *triiodide*. Diuretic in cardiac dropsy and pleuritic effusion. *Dose.*—2 to 10 grs.
7. **Caff. Sulphas.**—White crystals soluble in water. *Dose.*—½ to 5 grs.
8. **Caff Valerianas.**—White crystals. In hysteria and pertussis. *Dose.*—½ to 3 grs.
9. **Megranin.** *Syn.*—*Antipyrin Caffeino-Citricum.*—Crystals soluble in water. In headache but causes sleeplessness. *Dose.*—8 to 15 grs.
10. **Symphorol.**—Three compounds are sold under this name. They may consist of *caffeine-sulphonic acid* combined with lithium (**symphorol L.**), with natrium (**symphorol N.** Syn.—*Nasrol.*) with strontium (**symphorol S.**). All are white crystals and act as diuretics and are used in cardiac and renal dropsy. *Dose.*—10 to 15 grs.
11. **Ext. Kolæ Liq. B.P.C.**—Prepared from the seeds of *Cola vera* which contain about 2 to 2·5 p.c. of Caffein. *Dose.*—10 to 20 ms.

PHARMACOLOGY.

Internally.—Caffeine seems to stimulate, though not in every case, the salivary and gastric glands and dilate the gastro-intestinal blood-vessels. Hence, tea and coffee are **digestive adjuvants** under certain conditions. With some, coffee acts as a mild **aperient**. In excessive doses they are gastro-intestinal **irritants** causing dyspepsia.

Heart.—Caffeine readily enters the blood and circulates unchanged. In medicinal doses it not only **strengthens the force of the contractions** but **increases the systolic period**, and thereby shortens the diastolic one. As a consequence of this, the **arterial tension is heightened** and the pulse becomes fuller and slower; thus acting like digitalis in some measure. In toxic doses the pulse becomes very frequent, irregular and intermittent, and at last the heart stops in systole. These effects are largely due to the direct action of the drug on the cardiac muscle, and partly on the cardio-inhibitory centre.

Blood-vessels.—It first contracts then dilates the arterioles, thereby first raising and afterwards lowering the **blood-pressure**. This is caused by its direct action on their muscular coat, and to some extent on the vaso-motor centres.

Respiration.—In medicinal doses respiration is quickened and in large doses depressed from its action on the respiratory and cardiac centres.

Temperature is not affected by small doses, but is increased by large doses

Nervous system.—In small doses caffeine **stimulates** the **nerve-centres** in the **cerebrum, bulb** and **cord**. Its stimulating effect becomes apparent after a cup of tea or coffee by the removal of fatigue and languor, mental exhilaration and increased capability for work. In large doses it causes restlessness, wakefulness, ringing in the ears, delirium and tremors. The cord and muscles are not affected in man, but in frogs either tetanic spasms or muscular rigidity occurs. The sensory and motor nerves remain unaffected.

Metabolism.—We know little of its action on tissue-change, except the increased excretion of xanthine and urea in the urine. These may be derived directly from the caffeine.

Kidneys.—It has been experimentally seen that caffeine first contracts the kidneys with a diminished flow of urine, and then expands them with an increased diuresis, due to the contraction and dilatation of the renal vessels. It also stimulates the secreting cells. Thus by its influence on the heart and circulation and the secreting cells it acts as a **diuretic**, increasing the amount of water and urinary solids. Besides, its chemical composition being nearly allied to uric acid, it like urea has a powerful diuretic action. It does not appear to cause any inflammation of the tubules though eliminated by them.

Acute toxic action.—Burning in the throat, thirst, gastro-intestinal pain, violent vomiting and purging, giddiness, tremors in the extremities, free diuresis, clear intellect have been observed in a case of poisoning by 60 grs, of the citrate ; recovery taking place under the use of nitro-glycerin.

Chronic toxic action.—A slow development of toxic symptoms from excessive tea-drinking is very rare, but is well illustrated in the case of Mr. P. Phelan admitted into the Bellevue Hospital, New York. Thirty cups per day without food were drunk by him when he got awfully prostrated. Extreme indigestion, extreme anæmia, complete inability to move, great cardiac and respiratory distress were the chief symptoms. Another case of excessive tea drinking came under the notice of Dr. Gordon of the Jefferson Medical College, Philadelphia. She used to drink about 45 glasses (360 ozs.) of tea per day for two years before admission, and suffered mostly from symptoms of posterior and lateral sclerosis of the cord.

THERAPEUTICS.

Externally.—An infusion of tea is often used by the writer as a collyrium in simple conjunctivitis, a gargle for sore-throat, and a wash for irritable sores and ulcers. It may be injected either alone or with alum in otorrhœa and leucorrhœa.

Internally. **Heart.**—As a *cardiac stimulant* it has been found useful in many **cardiac diseases**, such as aortic or mitral obstruction. Its efficacy is greatly enhanced if it is combined with strychnine. As it can neither slow nor make the heart's beats regular, it cannot replace digitalis therapeutically. The writer has seen it tone up the heart and remove the intermittent character of the pulse brought on by large doses of *Apocynum cannabinum.* It is of signal service in **cardiac dropsy** on account of its dual effects on the heart and the kidneys. It may be used to strengthen the heart in many acute diseases, such as **pneumonia, fevers,** &c.

Lungs.—A cup of strong coffee occasionally relieves afit of **bronchial asthma.** The citrate in 5 grs. doses may be used with the same effect.

Nervous system.—In **migraine** the effervescent citrate or hydrobromide is sometimes useful but it is inferior to antipyrine or phenacetin.

Kidneys.—Caffeine is an uncertain diuretic. When it acts it causes a profuse flow of urine and is therefore advocated by many in **ascites, dropsy, pleuritic effusion,** &c. Whitla speaks favourably of it in **chronic Bright's disease,** as he has found it to reduce both albumen and anasarca. Many patients get habituated to its use, and its diuretic action is entirely lost on them after a week or so.

Antidote to poisons.—In opium or morphine poisoning tea or coffee has always been used with benefit.

Prescribing hints.—Caffeine may best be given in an effervescing form, but it may as well be combined with other drugs, such as strychnine or digitalis in a mixture, as they mutually help each other, or it may be continued alternately with digitalis. The writer always prescribes it with phenazone or phenacetin in cachets in *migraine.* Caffein sodio-salicylas may be used hypodermically, or be extemporaneously prepared by dissolving caffeine 20 grs. and sodium salicylate 17½ grs. in distilled water 1 dr. (3 ms. = 1 gr.). Caffeine causes sometimes so much insomnia that its use has to be discontinued.

CAJUPUTI OLEUM. Oil of Cajuput. N.O. *Myrtaceæ.*

Syn. I.V.—*Kayaputir tel,* Beng. *Kayaputi ke tel.* Hind. Bom.

Habitat.—Imported from Singapore and Batavia.

Source.—Distilled from the leaves of *Melaleuca Leucadendron.*

Characters.—Bluish-green; odor penetrating, agreeable, camphoraceous; taste aromatic, bitterish, camphoraceous. Sp. gr. 0·922 to 0·930. Colorless when rectified. *Solubility.*—In alcohol 90 p.c. *Impurities.*—Other oils, copper and camphor.

Identification.—Its color and smell help recognition.

Composition.—(1) *Cajuputine Hydrate* or cajuputol, isomeric with Borneo camphor, 75 p. c. (2) *Cincol,* a second oil. (3) *Cajuputein.*

Action.—Rubefacient, stimulant, antispasmodic. **B.P. Dose.**—½ to 3 ms.

Enters into.—Lin. Crotonis, and the

OFFICIAL PREPARATION.

1. **Spiritus Cajuputi.**—1 in 10. **B.P. Dose.**—5 to 20 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is a **stimulant** and **rubefacient** to the skin, and is therefore rubbed in as a gentle counter-irritant on the chest in **bronchitis, pneumonia, pleurodynia, pleuritis,** &c.; and over **painful** and chronically **inflamed joints.** It may be mixed with mustard oil or other stimulating and anodyne liniments. It has been applied with success in **eczema, psoriasis** and **acne rosacea.** As a **parasiticide** it may be employed in **tinea tonsurans.**

Internally.—It is a powerful **diffusible stimulant, carminative** and **antispasmodic,** and to some extent **narcotic.** As a stimulant it has been found useful in many **low conditions** of **fevers, bronchitis** or **broncho-pneumonia.** According to Whitla its stimulating action is almost equal to musk. It is an excellent remedy for **flatulent colic** or **intestinal spasm,** sometimes relieving the pain by a single dose of 20 ms. of the alcoholic solution. It has been recommended in **hysteria, neuralgia** and **chronic rheumatism.**

Prescribing hints.—It may be given on sugar, in sherry or in the form of an emulsion or pill.

CALCII CARBONAS PRÆCIPITATUS. Precipitated Calcium Carbonate. $CaCO_3$.

Syn. B.P.—Precipitated chalk. **Syn. I.V.**—*Khari*, Beng.

Source.—Obtained by the interaction of calcium chloride and sodium carbonate; $CaCl_2 + Na_2CO_3 = CaCO_3 + 2NaCl$.

Characters.—A whitish micro-crystalline powder insoluble in water. *Impurities.*—Phosphates, sulphates, iron and alumina.

Incompatibles.—Acids and sulphates.

Action.—Desiccant, antacid, slightly astringent. **B.P. Dose.**—10 to 60 grs.

Enters into.—Troch. Bismuth. Co. and Syr. Calc. Lactophosph.

CRETA PREPARATA. Prepared Chalk. $CaCO_3$.

Source.—Native calcium carbonate purified by elutriation.

Characters.—White friable masses or white powder. *Impurities.*—Iron, aluminium, magnesium, phosphates, sulphates, silica.

Incompatibles.—Acids and sulphates.

Action.—The same as above. **B.P. Dose.**—10 to 60 grs.

Enters into.—Hyd. c. Creta and the

OFFICIAL PREPARATIONS.

1. **Mistura Cretæ.** *Syn.—Chalk Mixture.*—The powders may be kept mixed in dry condition; 40 grs. to 1 oz. of cinnamon water when required. **B.P. Dose.**—½ to 1 oz. 1 to 2 drs. for a child 1 year old.
2. **Pulvis Cretæ Aromat.**—1 in 4½. **B.P. Dose.**—10 to 60 grs.

3. **Pulv. Cretæ Aromat. c. Opio.**—1 of opium in 40. **B.P.** **Dose.**—10 to 40 grs. 1 gr. for a child 1 year old.

NON-OFFICIAL PREPARATIONS.

1. **Cholera and Diarrhœa Mixture** (Board of Health's prescription.)—Pulv. Cretæ Arom. B.P. 1864 3 drs., Sp. Ammon. Arom. 3 drs., Tr. Catechu 10 drs., Tr. Card. Co. 6 drs., Tr. Opii 1 dr., Mist. Cretæ to 20 ozs. Mix. *Dose.*—1 oz. for an adult after each liquid motion.

2. **Tooth-Powder.**—Borax 4, Precipitated Chalk 8, Powdered Myrrh 2, Powdered Iridis 2, Powdered Cinnamon 2, Mix well and sift.

PHARMACOLOGY.

Externally.—Chalk is a mild **astringent** and **desiccant.**

Internally. **Alimentary canal.**—It acts as a direct local **antacid** neutralising free acids in the mouth and stomach. If not already acted upon, it passes readily into the intestine, where it acts as an **antacid** and a non-irritating **astringent**, caused by (1) the neutralisation of any acid it meets with forming a chloride or lactate, and thus reducing the secretion, by (2) its mechanical action, and by (3) some obscure sedative effect on the mucous membrane. Lime salts are feebly absorbed on account of their low diffusive power and are excreted with the fæces.

Kidneys.—Some think that calcium carbonate is a **diuretic,** because certain mineral waters, such as Contrexèville and Vittel containing calcium bicarbonate and sulphate among other salts, have been found useful solvents for **uric acid.** But there is no direct evidence.

THERAPEUTICS.

Externally.—Chalk may be used as a dusting powder in **excoriations, burns** and **weeping eczema.** Duckworth uses it in the form of an ointment (1 in 1 of benzoated lard) in **erysipelas.**

Internally. **Alimentary tract.**—It is used as a basis for almost all the tooth powders (see p. 122). As an *antacid* it may be used in **acid dyspepsia,** but lime water acts much better. It is an excellent remedy for mild **diarrhœa,** especially that of children with sour smelling stools. If the diarrhœa is caused by some irritating food, a dose of castor oil should precede its use. Lime salts are of special value in **acid poisoning,** especially in oxalic acid poisoning, as they form insoluble oxalates.

Nutrition.—Calcium carbonate is a useful remedy in deficient nutrition. Its good effects are well seen in children suffering from **rickets** and **mal-nutrition,** when given in very small doses. (See Calcium Phosphate.)

Kidneys.—It is never used as a diuretic, though Contrexéville and Vittel waters may be given largely before meals as solvents of **uric acid calculi.**

Prescribing hints.—Generally given in the form of chalk mixture with opium and astringent tinctures. Aromatic chalk powder with bismuth and grey powder is very useful in *infantile diarrhœa.*

CALCIUM CHLORIDUM. Calcium chloride.

$CaCl_2, 2H_2O$.

Source.—Formed by neutralising hydrochloric acid with calcium carbonate and desiccating below 392°F. $CaCO_3 + 2HCl + H_2O = CaCl_2 2H_2O + CO_2$.

Characters.—In dry, white, deliquescent masses. *Solubility*,—1 in 1 of water, 1 in 3 of alcohol 90 p.c. *Impurities.*—Iron, aluminium, magnesium and carbonates.

Dispensing hints.—As the salt is very deliquescent it should be preserved in hermetically sealed bottles, or in solution with the strength marked. Crystalline calcium chloride cannot be easily weighed.

Action.—Alterative, deobstruent, hæmostatic. **B.P. Dose.**—5 to 15 grs.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Calcium chloride is rarely used, though its lotion has been found occasionally to relieve **pruritus.**

Internally.—It is an excellent **alterative**, slowing and strengthening the pulse, and was largely employed in former years in **scrofula** with glandular enlargements of the neck, **rickets, tuberculosis**, and **chronic diarrhœa** with impaired digestion. It is seldom used now in these cases. Its most important action is that it **increases the coagulability of the blood** more powerfully than any other lime salts; hence it is most valuable in **internal hæmorrhages**, either from the lungs, gastro-intestinal tract or other organs. The writer uses it in 10 to 15 gr. doses in preference to ergot in **hæmoptysis, hæmatemesis, intestinal** and **hæmorrhoidal bleeding**, and **menorrhagia**, and finds it always effective. It is the only remedy which can arrest and prevent bleeding in **hæmophilia**. As the increased coagulability of the blood does not continue long even though the drug is pushed on, it is not so effective in **aneurism**, although cases are recorded in which great improvement followed from its use in 15 to 30 gr. doses. Many speak highly of it in **lobar pneumonia** in 5 to 15 gr. doses every 4 hours.

Prescribing hints.—It may be given, safely up to 30 grs. three times a day. It is best given in solution or in milk after food. In *hæmophilia* 60 gr. doses have been given without bad results. But as all lime salts are feebly absorbed, we are doubtful as to the wisdom of giving it in excessive doses as it is apt to derange the stomach.

CALX. Lime. CaO. (*Unslaked lime.*)

Syn. I.V.—*Chun*, Beng, *Chunám*, Hind.

Source.—Obtained by calcining chalk, lime stone or marble.

Characters.—In compact whitish masses which swell and fall to powder by absorbing water.

Action.—Caustic. Not used internally.

CALCII HYDRAS. Calcium Hydroxide. $Ca(HO)_2$.

Syn. B.P.—Slaked lime. **Syn. I.V.**—*Chun*, Beng. *Chundm*, Hind.

Source.—Recently prepared by the interaction of water and calcium oxide.

Characters.—A white alkaline powder. *Solubility.*—1 in 900 of water, and 1 in 60 if sugar is added. *Impurities.*—Iron, aluminium, silica, alkalis and their salts.

Incompatibles.—Vegetable and mineral acids, alkaline and metallic salts, tartar emetic.

Enters into.—The preparation of Calc. Hypophosph., Chloroform, Ext. Ipecac. Liq. and the

OFFICIAL PREPARATIONS.

1. **Linimentum Calcis.**—1 in 2. A substitute for **Carron oil** which is made of lime water and linseed-oil. A sedative application to burns and scalds.

2 **Liquor Calcis.** *Syn.—Lime Water.*—½ gr. in 1 oz. It should be kept full in green bottles well corked. **B.P. Dose.**—1 to 4 ozs., ½ to 1 dr. for a child 1 year old. *Enters into.*—The preparation of Argent. Oxid. Lin. Calcis, Lotio Hydrarg. Flav. and Lotio Hydrarg. Nigra.

3. **Liquor Calcis Saccharatus.**—8 grs. in 1 oz. Should be mixed with the solution of sugar in distilled water. **B.P. Dose.**—20 to 60 ms.

PHARMACOLOGY.

Externally.—Unslaked or slaked lime is a **caustic**, but its action is localised. Limewater is a local **sedative** and **astringent** when applied to the broken skin.

Internally. **Alimentary canal.**—Like chalk lime neutralises free acids of the contents of the stomach and acts as an **antacid**, but more powerfully, and thus controls the curdling of milk. It has a slight **sedative** property. In the intestine it acts as an **astringent** like chalk, but in a less degree. It is an **antidote** for poisoning by mineral acids, oxalic acid and zinc chloride. An injection of lime water kills thread worm.

Heart and circulation.—Only a minute quantity enters the blood and is found in the plasma as a phosphate. It has been experimentally proved that a full physiological quantity of lime circulating in the blood maintains a complete contraction of the heart, while a deficient supply weakens it. It also accelerates the coagulability of the blood and thus acts as a remote **hæmostatic**, but not so powerfully as the calcium chloride.

Kidneys.—The greater portion of lime is excreted by the fæces, only a small quantity passes through the kidneys, rendering the **urine alkaline**.

THERAPEUTICS.

Externally.—As a *caustic* in the form of Vienna Paste (slaked lime 6, caustic potash 5, alcohol 90 p.c. *q.s.*), slaked lime may be used to destroy **warts** and small **epithelial** and other **growths.** Lime water either with linseed oil (Carron Oil), olive oil or glycerin is a soothing application to **burns, scalds** and **cracked nipples.** An addition of 1 to 2 p.c. of carbolic acid increases its efficacy. It makes a soothing astringent dressing for weeping **eczema**, and may be used as an injection to lessen the discharges in **leucorrhœa, gonorrhœa, gleet, otorrhœa,** &c., even when inflammation is present. It may be injected into the rectum in **thread worm.**

Internally. **Alimentary tract.**—Lime water makes a good mouth-wash for **ulcerative stomatitis.** It is said to dissolve false membranes of **croup** and **diphtheria.** It may either be used as a spray or applied by a pencil. It is chiefly used to prevent the **curdling of milk** (1 in 3 or more) and check **vomiting.** In **acid dyspepsia, gastrodynia** and **cancer** in the stomach, it must be freely employed with milk (1 in 1) to prevent its regurgitatation. In the same way it may be given in **enteric diarrhœa** and other affections to prevent the milk from forming hard indigestible lumps. As an astringent it is useful in mild **infantile diarrhœa.**

Urine.—Prolonged use of lime is said to dissolve **stones** in the bladder, but this is only a supposition.

Prescribing hints.—Lime water is ordinarily given in milk. If from its addition the bulk is increased, saccharated lime water may be substituted. To suckling babies one tea-spoonful with equal quantity of milk may be given every 3 hours before nursing, and to hand-fed ones mixed with their food.

CALCII HYPOPHOSPHIS. See Phosphorus.

CALCII PHOSPHAS. Calcium Phosphate. $Ca_3(PO_4)_2$.

Source.—Obtained by (1) dissolving bone-ash in dilute hydrochloric acid, adding the liquid to dilute solution of ammonia, and washing and drying the precipitate, or (2) by interacting calcium chloride and sodium phosphate.

Characters.—A light white amorphous powder. *Solubility.*—Insoluble in water, soluble in dilute hydrochloric acid and nitric acid. *Impurities.*—Lead, copper, arsenium, iron, aluminium, magnesium, silica, carbonates and calcium oxalate.

Action.—Alterative, tonic. **B.P. Dose.**—5 to 15 grs.

Enters into.—The preparation of Ext. Euonymi Sicc. and Pulv. Antimonialis.

OFFICIAL PREPARATION.

1. **Syr. Calcii Lactophosphatis.** See p. 193.

NON-OFFICIAL PREPARATION.

1. **Calcii Glycero-Phosph.**—A white crystalline powder soluble in water. A most effective soluble salt. *Dose.*—3 to 10 grs.
2. **Syr. Ferri Phosph. Comp. B.P.C.** See **Ferri Phosph.**

PHARMACOLOGY.

Internally.—Calcium phosphate forms the basis of new tissues and is found in excess when cell-growth is active whether normal or pathological. It has been experimentally observed that the withdrawal of lime salts from the food of animals renders their bones soft and spongy, and their fractures unite more speedily when calcium phosphate is administered to them. Hence it is an essentially needed article of food for the nutrition and growth of nitrogenous, fatty and bony tissues. In the stomach it is acted upon by free acids and forms a soluble superphosphate, in which form it is absorbed in very small quantities, and the rest passes into the intestine unchanged. If given in excess it deranges digestion, and if continued long may form concretions in the intestine.

THERAPEUTICS.

Internally.—As a *promoter* of nutrition and cell-growth, calcium phosphate is exceedingly useful in the case of **overgrowing children**; women weakened by child-bearing, prolonged suckling or excessive menstruation; **anæmia**; and **exhaustion** brought on by **prolonged suppuration, diarrhœa, leucorrhœa, chronic bronchitis, phthisis**; &c. It may also be given to expedite the union of **fractures** and the healing of **caries of bones.** Benekè considers it most efficacious in those diseases in which the phosphate is passed off in excess with the urine, *e.g.*, hectic. It is an excellent remedy for those whose health has suffered from long residence in town or from overwork. It acts remarkably well in **rickets** by rectifying the faulty nutrition and inducing a more healthy growth. But it should not be commenced until the pains and tenderness of bones have subsided. It is also recommended in **adenitis** and **mollities ossium.**

Prescribing hints.—It is useless to give this or other lime salts in large doses as they are not freely absorbed. Either the Syrup Calcis Lactophosphatis, or the powdered phosphate in 1 or 2 gr. doses several times a day, after food, may be given with advantage. Iron or other lime salts when combined with it, as in Parrish's Chemical Food, enhance its efficacy For infusion of a saline solution into a vein, calcium phosphate may be profitably added to it to sustain the cardiac contraction.

CALX CHLORINATA. See Chlorum.

CALX SULPHURATA. Sulphurated Lime.

Syn.—Calcium Sulphide, Canton's Phosphorus.

Source.—A mixture containing not much less than 50 p.c.

of calcium sulphide, CaS., with calcium sulphate and carbon. May be prepared by heating a mixture of native calcium sulphide and carbon.

Characters.—A greyish-white powder with a smell of hydrogen sulphide.

Action.—Antisuppurative. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr. *Maximum Daily Dose.*—8 grs.

NON-OFFICIAL PREPARATION.

1. **Lotio Calcii Sulphurati. U.C.H.**—Slaked lime 4, Sublimed Sulphur 4, Distilled Water 35. Boil, evaporate and filter to 20. May cure itch in half an hour when applied after a warm bath.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Its chief property is to hasten the maturation of and to prevent the formation of **boils**. It has also been found useful in carbuncles, acne, suppurating glands in the neck, periostitis, alveolar abscess, and inflammatory processes induced by influenza.

Prescribing hints.—It is best given in pills (see p. 87.) The pills can be had ready-made containing each $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 gr.

ADDITIONAL NON-OFFICIAL DERIVATIVES OF CALCIUM.

1. **Calcium Iodate.** *Syn.—Calcinol.*—A substitute for iodoform and a gastro-intestinal antiseptic. *Dose.*—3 to 4 grs.
2. **Calc. Carbide.**—In blackish crystalline masses, evolving acetylene gas when moistened with water. Said to check bleeding, fetor and discharge when applied to inoperable dried ulcerated uterine cancer with a tampon over it.
3. **Calc. Peroxide.** *Syn.—Gorit.*—Explodes when moistened with glycerin or formalin. In acid dyspepsia. *Dose.*—3 to 9 grs.
4. **Calc. Borate.**—An antiseptic. Useful in gangrenous ulcers, wounds and diarrhœa. *Dose.*—10 to 15 grs.

CALOTROPIS. Calotropis. N.O. *Asclepiadeæ.*

(*Ind. and Col. Addendum.*)

Syn. B.P.—Mudar. **Syn. I.V.**—*Akand shikarer chhál*, Beng. *Mádár* Hind. *Setharka*, Sans.

Habitat,—India, Eastern Colonies.

Source.—The dried root-bark of *Calcptris procera* and of *Caloptris Gigantea* (*Seth Akand*) freed from outer corky layer.

It should be gathered in April and May from plants grown in sandy soils and dried without the sun before peeling off the bark.

Characters.—In short, quilled pieces, $\frac{1}{10}$ to $\frac{1}{5}$ in. thick, $1\frac{1}{2}$ in. wide, covered with soft, greyish, strongly furrowed periderm. This *layer should be removed before powdering.* Odor faint. Taste mucilaginous, bitter, acid.

Composition.—(1) *An Active Principle* $C_{17}H_{28}O$.

B.P. Dose.—3 to 10 grs. as a tonic ; 30 to 60 grs. as an emetic.

OFFICIAL PREPARATION.

1. **Tinctura Caloptris.**—Caloptris 2 ozs., Alcohol 60 p.c. *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The fresh leaves are considered **anodyne** and are usefully applied warmed to painful joints and subacute inflammatory swellings. The fresh juice is a **rubefacient** and **caustic.**

Internally.—In small doses 3 to 10 grs, three or four times a day, the root-bark acts as an **alterative, tonic** and **expectorant,** but if given every half hour it is a powerful **nauseant, diaphoretic** and gastro-intestinal **irritant.** In 30 to 60 grs. it acts as an **emetic** with much nausea.

As an alterative it has been found useful in **chronic rheumatism, secondary syphilis** and **incipient leprosy.** The writer has seen its good result in a case of incipient leprosy. Its powder has been found successful in **mucus diarrhœa** and **dysentery** and is considered to be a good substitute for ipecacuanha in these diseases. A decoction of the root-bark (1 to 2 ozs.) or a fluid extract of the leaves (1 to 5 ms.) is said to arrest **ague.** The flowers are used in **asthma** and **bronchitis.** The brushing of the os with the fresh juice is said to cause abortion. The fresh juce is a poison and will kill a dog in 15 minutes.

CALUMBÆ RADIX Calumba Root. N.O. *Menispermaceæ.*

Habitat.—Eastern Africa, between Ibo and the Zambesi.

Source.—The dried transversely cut slices of the root of *Jateorhiza Columba.*

Characters.—In flattish, circular or oval, centrally depressed pieces ; 1 to 2 in. in diameter, ⅛ to ½ in. in thickness ; yellowish. Cork brownish wrinkled ; cortex thick with radiating lines.

Identification.—It is easily recognised by its *concave depression* on each side, the dark line running near the edge, the radiating lines of the cork and the characteristic yellowish coloring which becomes more prominent when moistened.

Composition.—(1) *Calumbin,* a whitish crystalline neutral bitter principle. (2) *Berberine,* an alkaloid imparting the yellow color. (3) *Calumbic Acid.* (4) *Starch.* (5) *Mucilage.* No tannic acid.

Action.—Stomachic tonic.

OFFICIAL PREPARATIONS.

1. **Infusum Calumbæ.**—1 in 20 (¼ hour). Infuse in cold water so as to avoid dissolving starch to a great extent. It decomposes in hot weather. **B.P. Dose.**—½ to 1 oz.

2. **Liquor Calumbæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

3. **Tinctura Calumbæ.**—1 in 10. Brownish. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Externally.—Calumba may be taken as a prototype of pure vegetable bitters. It is a mild **antiseptic** and **germicide**.

Internally. **Mouth.**—It is a pure **bitter**. It stimulates the nerves of taste and reflexly the **salivary** and **gastric secretions**.

Stomach.—On reaching the stomach it further stimulates the gastric circulation by its direct action on the local nerves, and thereby increases a free flow of the gastric juice which may, though briefly, be diminished in the beginning. Morever, the gastric mucous membrane is to some extent stimulated by the saliva reaching the stomach as well as by the reflex stimulation through the peripheral nerves of the tongue and mouth. As a consequence of these actions, appetite is sharpened and a better digestion is effected, hence an improved assimilation. It is therefore a **stomachic tonic** and **appetiser**. The efficacy of pure bitters may be increased by combining them with aromatics or alcohols. Large doses produce opposite effects, *i e*, depress the secretions. If continued long they derange digestion by producing gastric catarrh.

Intestine.—Calumba only slightly increases the peristalsis of the gastro-intestinal canal, but aromatic bitters do it more powerfully. To a certain extent it moderates decomposition. It is therefore a mild **carminative** and internal **antiseptic**. All pure bitters especially the quassia are **anthelmintics**.

Blood.—Most of the bitters like the volatile oils aid the migration of increased number of leucocytes into the blood from the intestinal glands.

THERAPEUTICS.

Internally.—As a most useful *stomachic tonic* it is almost daily used to promote digestion in cases where the stomach participates in the **general enfeeblement** in the functional activity of all the organs of the body caused by various diseases, overwork or starvation ; such as convalescence from acute diseases, anæmia, dyspepsia, phthisis, &c. It is contra-indicated in such diseases of the stomach as are accompanied with pain, vomiting, inflammation or ulceration such as gastritis,, gastrodynia, gastric ulcer, gastric cancer. Its infusion ($\frac{1}{2}$ pint) may be injected into the rectum in **thread worm**.

Prescribing hints.—Bitters should not be given in a concentrated form or for a long period without interruption. Calumba is the least irritant of all bitters and being free from tannin can be given with iron. If there is a tendency to biliousness it is best given with diluted nitro-hydrochloric acid, or to any irritability of the stomach with alkalis and bismuth salts. It is better to give it 20 to 30 minutes before meals. As the infusion decomposes in hot weather the tincture may be used in its stead : 1 dr. being equal to 1 oz. of the infusion.

CAMBOGIA. Gamboge. N.O. *Guttiferæ.*

Habitat.—Siam.

Source.—A gum-resin obtained from *Garcinia Hanburii.*

Characters.—In cylindrical solid or hollow rolls, longitudinally striated, distinct or agglutinated, breaking with a conchoidal fracture. Fractured surface smooth, reddish-yellow. Powder bright yellow. No odor. Taste acrid. *Solubility.*—Completely by the successive action of alcohol 90 p.c. and water. *Impurities.*—Starch, mineral matters and woody fibres.

Composition.—(1) A brilliant yellow *Resin—Cambogic Acid*, the active ingredient 75 p.c (2) *Gum*, 15 to 20 p.c.

Action.—Hydragogue purgative. **B.P. Dose.**—½ to 2 grs.

OFFICIAL PREPARATION.

1. **Pilula Cambogiæ Composita.**—1 in 6 nearly. **B.P. Dose.**—4 to 8 grs.

CAMBOGIA INDICA. Indian Gamboge.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern Colonies.

Source.—Gum-resin obtained from *Garcinia Morella.*

Characters.—It must have all the important characters and must respond to the tests of the B.P. Gamboge. *Impurities.*—Particles of wood, leaves and similar extraneous matters. **B.P. Dose.**—½ to 2 grs.

PHARMACOLOGY.

Internally. **Gastro-intestinal tract.**—In medicinal doses, it acts as a **hydragogue purgative**, due to the increased glandular secretion and peristalsis. In large doses it is an **irritant** producing vomiting and purging with considerable griping. In toxic doses it causes gastro-enteritis and death. Its action is most marked on the small intestine.

Liver.—No action on the liver, though the presence of bile and fat is necessary for its absorption.

Kidneys.—Its resin is slightly absorbed and thrown out by the kidneys rendering the **urine yellow**, and increasing slightly **diuresis.**

THERAPEUTICS.

Internally.—It is rarely prescribed except in **dropsy, obstinate constipation**, and **cerebral congestion.** It should not be given to children, old people or in the inflamed conditions of the abdominal or pelvic visceræ.

CAMPHORA. Camphor. $C_{10}H_{16}O$. N.O. *Laurineæ.*

Syn. I.V.—*Karpur*, Beng. *Káfur*, *kapur*, Hind.

Habitat.—China (Formosa), Japan, East Indies.

Source—Obtained from *Cinnamomum Camphora*, purified by sublimation.

Chips of wood are distilled and the distilled product deposits crystals of camphor on cooling.

There are three varieties, *viz.*, (1) *Formosa camphor*, (2) *Borneo or Barus camphor*, known in India as *Bhimsaini kapur* and (3) *Blumea or Ngai camphor.* The second variety is highly prized by the natives and is sold at a very high price. It is naturally formed in the stems of *Dryobalanops Camphora*, grown in Dutch Sumatra, and sinks in water.

Characters.—In solid, colorless, transparent, crystalline pieces of tough consistence; also in rectangular tablets or pulverulent masses—"Flowers of Camphor," Sp. gr. 0·995. Odor penetrating. Taste bitter, pungent, followed by a sensation of cold. Burns and volatalises. *Solubility.*—1 in 700 of water, 1 in 1 of alcohol 90 p.c., 4 in 1 of chloroform, 1 in 4 of olive oil, 1 in 1½ of oil of turpentine. It forms a liquid when triturated with chloral hydrate, menthol, phenol or thymol.

Action.—Stimulant, antispasmodic. **B P. Dose.**—2 to 5 grs.

Enters into.—Lint. Aconiti, Lint. Bellad., Lint. Opii, Lint. Sapon., Lint. Sinapis, Lint. Tereb., Ung. Hyd. Co. and the

OFFICIAL PREPARATIONS.

1. **Aqua Camphoræ.**—About ½ gr. in 1 oz. *Dose.*—1 to 2 ozs.
2. **Linimentum Camphoræ.** *Syn. B.P.—Camphorated Oil.*—1 in 5 nearly. A yellow oily liquid. *Enters into.*—Lint. Chlorof., Lint. Hydrarg., Lint. Tereb, Acet.
3. **Linimentum Camphoræ Ammoniatum.** *Syn. B.P.—Lint. Camph. Co.*—1 in 8. Faintly yellowish. Rubefacient and counter-irritant.
4. **Spiritus Camphoræ.** *Syn.—Tr. Camphoræ.*—1 in 10. **B.P. Dose.**—5 to 20 ms. on sugar or in emulsion.
5. **Tinct. Camphoræ Comp.** *Syn. B.P.—Paregoric, Paregoric Elixir.*—¼ gr. of opium in 1 dr. Sherry colored. Expectorant, narcotic. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Acidum Camphoricum.**—A white crystalline powder slightly soluble in water. In phthisical night-sweats and vesical catarrh. *Dose.*—10 to 30 grs. in cachets.
2. **Camphor Ball.**—Camphor 2, White Beeswax 5, Spermaceti 3, Ahmond Oil 3, Tr. of Tolu ¼. Melt and pour in ½ oz. gallipots. Applied to chapped skin.
3. **Spirit. Camph. Fort.** *Syn.—Rubini's Essence.*—Flowers of Camphor 1, Absolute Alcohol 1, (by weight), or a saturated solution in alcohol 90 p.c. *Dose.*—2 to 5 drops every 15 minutes in choleraic diarrhœa.
4. **Oxycamphor.**—A white crystalline powder soluble 1 in 5 of water. In dyspepsia. *Dose.*—7 to 15 grs.
5. **Camphor Monobromide.**—In colorless prisms, insoluble in water. A hypnotic and nervous sedative in hysteria, chorea, delirium

tremens and petit mal. *Dose.*—2 to 10 grs. in pill or dissolved in almond oil and then emulsified.

6. **Chloral, Menthol, Phenol, Thymol,** and **Resorcin Camphors.**—1 in 1. Triturate and heat if necessary. Very useful local anodynes.

PHARMACOLOGY.

Externally.—Camphor acts like volatile oils, as it itself is a solid volatile oil or stearoptene. It is a feeble **antiseptic** and a direct local **vascular stimulant** exciting redness and heat, and is therefore a mild **rubefacient.** It first stimulates then depresses the local nerves causing a slight **anæsthesia.**

Internally. **Alimentary tract.**—It has a peculiar bitter taste and produces a sensation of coldness soon followed by that of warmth in the mouth. It stimulates the local circulation and the secretion of saliva and mucus in the mouth. In the stomach it causes (1) a sense of warmth, (2) dilates the blood-vessels, (3) increases the flow of gastric juice and (4) the peristaltic movements. It is therefore a **gastric stimulant** and **carminative.** It is also a feeble **antiseptic** and a **reflex excitant** of the heart and the cerebro-spinal centres. In the intestine it acts in the same way.

Heart and circulation.—It enters the blood unchanged from the skin and the mucous membrane, and increases the number of leucocytes apparently from the stimulation of the circulation of the abdominal organs. The heart is stimulated directly and reflexly from the stomach, rendering the pulse fuller and stronger without much affecting the number. Large doses weaken and quicken the pulse.

Respiration.—It slightly stimulates the respiration and the bronchial secretion by increasing the vascularity of the bronchial mucous membrane. It is therefore a feeble **expectorant.**

Nervous system.—Its chief action is on the nervous system, but it is a capricious drug With some it acts as an **exhilarant** causing agreeable hallucinations with a desire to laugh or dance, and with others as an **intoxicant** or **depressant.** It first stimulates then depresses the **reflex movements** and is therefore an **antispasmodic.**

Skin.—It is excreted with the sweat, which it increases by directly affecting the sweat-centres and locally the sweat-glands.

Metabolism.—We do not know much of its action on tissue-change, except that it reduces the temperature both in health and fever, and that it is excreted in the urine as (1) campho-glycuronic acid and as (2) an amido-derivative. These bodies are formed in the system, the former being a compound of camphorol (one atom of H in camphor is replaced by OH) and glycuronic acid.

Genital organs.—In moderate doses it is said to act as an **aphrodisiac** and in large doses as an **anaphrodisiac.** Large doses are said to cause abortion.

Elimination.—It is exceted by the bronchial mucous membrane almost unchanged, skin and kidneys as complex products, and fæces.

Acute toxic action.—Poisoning by camphor is rare. The writer has seen only one case of poisoning. Epigastric pain, nausea, sometimes vomiting, giddiness, dimness of sight, delirium verging to mania, epileptiform convulsions, cyanosis, paralysis, cold clammy perspiration, strangury or arrest of urinary secretion, coma and death.

Antidotes.—Emetics, pump, brisk saline cathartics, cold and hot douches, counter-irritation, sometimes stimulants, and strychnine hypodermically if necessary.

Chronic toxic action.—Young women sometimes make a habit of eating camphor regularly with a view to improve their complexion. This habit if once contracted is very difficult to shake it off. Mild form of exhilaration, stupefaction, extreme weakness and pallor are the chief symptoms.

THERAPEUTICS.

Externally.—Being easily available, camphor is a favourite domestic ingredient for many liniments, for **lessening** the **pain** of **lumbago, myalgia** and chronic **rheumatism.** Its liniment has been applied to **stimulate** the **absorption** of the effused products in **sprains** and **inflammatory swellings** of **joints,** rheumatic or otherwise. The ammoniated camphor liniment and the turpentine and acetic acid liniment are very effective **counter-irritants** in **bronchitis, pleuritis** and **broncho-pneumonia.** Camphor has been dusted on **indolent sores** and in combination with dusting powders on **eczema** and **intertrigo.** Mixed with zinc ointment (½ dr. to 1 oz.) it allays the itching of **eczema genitalis.** Dissolved in chloroform and mixed with simple ointment, it has been found to soothe the **irritation** of **piles.** The spirit of camphor arrests the progress of **boils** and **bedsores** if applied in the earliest stages. Chloral-Camphor or Menthol-Camphor are most valuable local anodynes in superficial **neuralgias.**

Internally. **Alimentary canal.**—With chalk it is often used as a tooth-powder (1 in 8), and with prepared *pan* as a corrective of foul breath. Chloral-Camphor relieves **toothache** when put into a carious tooth. Camphor Julep—Mist. (aqua) Camphorpæ B. P. 1864—is a domestic carminative for **flatulence** and **colic** of children. The spirit of camphor may be given in flatulence and colic of adults. Very few medicines can excel camphor in its efficacy in **summer diarrhœa** and **cholera.** The spirit of camphor should be given in these cases from the commencement of the illness in 5 to 6 m. doses every 10 or 15 minutes till the symptoms abate and then hourly. It is useless to give late. Many consider Rubini's solution more efficient in these cases.

Respiratory tract.—The inhalation of camphor or the sniffing up of the powdered drug relieves **coryza** and that form of chronic **catarrh** which is characterised by **incessant sneezing**

after intervals of complete subsidence. A few drops given as well by the mouth (5 drops every 15 minutes) would help the inhalation. It is exceedingly useful in **chronic bronchitis** if given either in the form of Paregoric or a few grains mixed with an expectorant mixture.

Circulation.—Graves recommends camphor in **adynamic fevers,** saying that it strengthens and reduces the frequency of the pulse, controls the delirium and moistens the skin. In Germany it is considered to be a valuable cardiac stimulant in threatened **cardiac failure.** The writer often uses camphor and musk together as a cardiac stimulant in the **collapse** of **fevers** and other diseases.

Nervous system.—In many **spasmodic affections,** such as, nervous palpitation, chorea, hysteria, whooping cough, &c, it has been given with doubtful results.

Genital organs.—Large doses check inordinate **sexual desire** and **chordee.** Applied to the breast and given by the mouth in 3 gr. doses, camphor acts as an **antigalactogogue.**

Prescribing hints.—It is best given dissolved in milk (1 dr. in 1 oz.). The essence or Rubini's tincture on sugar or in emulsion. The powdered camphor may be given in pills or cachets. Hypodermically it may be given dissolved in almond oil (1 in 5) in collapse (Binz)

CANNABIS INDICA. Indian Hemp. N.O. *Cannabinaceæ.*

Syn. I. V.—*Gánjá,* Beng. Hind.

Habitat.—India, chiefly in Bengal.

Source.—The dried flowering or fruiting tops of the female plant of *Cannabis Sativa,* grown in India from which no resin has been removed.

There are three varieties, *viz.,*—(1) *flat,* (2) *round,* and (3) *powdered* (*chur*) Ganja. The last one is best suited for pharmaceutical preparations. *Ganja two years old loses all its active properties.*

Characters.—In compressed, rough, dusky-green masses consisting of the branched upper part of the stem, bearing leaves and pistillate flowers or fruits matted together by a resinous secretion. Upper leaves simple alternate, 1-3 partite. Lower opposite, digitate. Fruits one-seeded supported by a bract.

Composition.—(1) An active constituent a *Resin* known best as *cannabinon.* (2) A *Volatile Oil.* (3) An unimportant alkaloid.

Incompatibles.—Water and watery infusions precipitate the resin.

Action.—Deliriant, anodyne, hypnotic.

OFFICIAL PREPARATIONS.

1. **Extractum Cannabis Indicæ.**—A rich green resinous extract. **B. P. Dose.**—¼ to 1 gr. *Enters into.*—

(*a.*) **Tinctura Cannabis Indicæ.**—1 in 20. 22 ms. contain 1 gr. of extract. Deep green. **B. P. Dose.**—5 to 15 ms. *Enters into.*—Tr. Chlorof. et Morph. Co.

NON-OFFICIAL PREPARATIONS.

1. **Cannabinæ Tannas.**—An amorphous yellowish powder sparingly soluble in water. An uncertain hypnotic. *Dose.*—2 to 10 grs.
2. **Cannabinon.**—A purified resin like treacle. *Dose.*—¼ to 1 gr.

The resin that naturally exudes from the leaves and stem is called **Charas.**

PHARMACOLOGY.

Externally.—In the opinion of the writer the Indian hemp has a feeble **anodyne** property.

Internally. **Gastro-intestinal tract.**—In small doses it sharpens appetite which becomes sometimes so ravenous that it cannot be appeased by food. It also promotes digestion but does not derange it so powerfully as opium. If indulged in long it may cause loss of appetite and gastric derangement. It does not cause constipation or diarrhœa.

Nervous system. (1) *Cerebrum.*—Its chief action is on the cerebral convolutions resembling in many respects that of alcohol or opium but variable, due to (*a*) uncertainty of the strength of the drug and (*b*) individual peculiarities. In small doses either smoked or taken by the mouth, it causes a **pleasurable sensation** of gay, joyful and exalted ideas and a refreshed feeling, particularly after bodily or mental fatigue. Under its influence the knowledge of time and personality is lost. Should it be continued, it causes **intoxication** and the dosed person loses self control. He becomes very talkative and laughs at everything, merging into a sort of "waking delirium." Hence, it is an **exhilarant** and **deliriant.** The delirium, generally noisy and restless, is accompanied with muscular excitement, and is followed by **sleep,** which is often attended with delightful dreams. Sometimes there is a considerable amount of heaviness in the head and the patient feels "a sensation as of the brain boiling over and lifting the cranial arch." In large doses it induces a sort of **catalepsy** followed by coma and death from cardiac failure.

(2) *Sensory nerves* are depressed and there is a sense of tingling and **anæsthesia** of the skin. The muscular sense is also lost and pain if present is lessened or removed. Hence it is an **anodyne** but is not so powerful as opium or belladonna.

Heart and **circulation.**—Its action on the heart is uncertain. The pulse may be either first quickened, then slowed, or *vice versa*, probably from its effects on the cardio inhibitory centre and the heart-substance. The blood-pressure therefore either rises or falls.

Respiration is first quickened and afterwards slowed.

Temperature may rise during the stage of excitement and fall during sleep.

Kidneys.—The secretion of urine is slightly increased from the increased blood-pressure, but the prepared *bhang*, *sidhi* or *sabji* produces copious diuresis.

Muscles.—In small doses motor activity is increased and in large doses depressed, causing a relaxation of muscles. It is therefore an **antispasmodic.**

Genital organs.—In small doses it is an **aphrodisiac,** caused chiefly by stimulating the cerebrum and reflexly the genital centre, (see p. 164) and partly by dilating the pelvic blood vessels. Repeated stimulation of the sexual organs is followed by impotence.

Toleration—Like opium or alcohol it produces a tolerance of the drug. The *habitués* may smoke ganja to the extent of about half an ounce or more per diem.

Acute toxic action—Poisoning by Indian hemp is rather rare. When it occurs, the symptoms are those that have already been alluded to : catalepsy being most important.

Antidotes.—Emetics or pump if swallowed. Vegetable acids especially lime juice, cold affusion, stimulants, strychnine, counter-irritation to the nape of the neck.

Chronic toxic action.—*Ganja*-smoking is very prevalant in India, and if presevered in, it causes loss of appetite, emaciation, trembling gait, insanity (mania or melancholia) and mental weakness. **Hashish,** an Arabian aromatic confection of Indian hemp, produces similar effects. **Bhang**—a cold infusion of leaves and fruits with aromatics—is daily indulged in by most of the people of the North Western Provinces without much deliterious effects.

THERAPEUTICS.

Externally.—Mixed with linseed-meal (1 in 4), Indian hemp in the form of a poultice has been found by the writer to allay the irritation and pain of **inflamed piles** and **anal fissure.** The leaves (*sidhi*) warmed dry may be used as a fomentation for the same purpose. A watery paste of *charas* relieves **anal pruritus.**

Internally. **Gastro-intestinal tract.**—As an *appetiser* and *stomachic tonic* it has been found valuable in **dyspepsia** and **dyspeptic diarrhœa.** The natives of this country use *prepared bhang* (see above) in these diseases It has been found to soothe the pain of **gastralgia** and correct the griping property of purgatives.

Respiratory tract.—It may be given to relieve **phthisical, whooping** or **asthmatic coughs.** Its smoke checks **asthma.**

Nervous system.—As an *analgesic* Indian hemp is most valuable in **migraine.** In fact, it was the remedy for this and other **headaches** before the introduction of phenazone and its congeners. Even now, it is used occasionally with great benefit in **continuous headaches,** and in headaches due to menopause, worry and fatigue. As a *hypnotic* it is not generally used now, though it has been found sometimes useful in **insomnia, delirium tremens** and **mania** when given with bromides. Sir

Russell Reynolds strongly recommends the extract ($\frac{1}{4}$ to $\frac{1}{3}$ gr.) in **senile insomnia.** With chloral hydrate it may be serviceable in **chorea.** As an *anodyne antispasmodic* it is well spoken of in **intestinal, biliary** and **renal colics, spasm** of the **bladder** and **chordee.** Its beneficial effects in **tetanus** have been long recognised. The writer can testify to its value from long personal experience.

Genital organs.—In **metrorrhagia, spasmodic** and **nervous dysmenorrhœa**, and **ovarian irritation,** it not only relieves the pain but seems to act favourably on the uterine muscular fibres. Occasionally it is used in **subacute gonorrhæa** and **impotence.**

Kidneys.—In acute and chronic **Bright's disease** it has been found to allay pain in the renal region, and remove **hæmaturia.**

Malarious fevers.—The writer believes in its mild **antiperiodic** and **prophylactic** virtues against **malarious fevers,** and expressed this his opinion before the Royal Ganja Commission held in Calcutta, 1894.

Prescribing hints.—The extract is given in pill massed with liquorice powder. Because its strength varies it is safer to commence with a smaller dose, for toxic symptoms have been produced by one grain. The tincture may be given on sugar or suspended by mucilage of acacia (1 dr. to 1 oz.).

CANTHARIS. Cantharides. N. O. *Coleoptera.*

Syn.—Spanish or blistering fly, lytta.

Habitat.—Spain, Italy, Hungary and Russia. Those from Russia are supposed to be the best.

Source.—The dried beetle, *Cantharis vesicatoria.*

Characters.—$\frac{3}{4}$ to 1 in. long, $\frac{1}{4}$ in. broad, with 2 long elytra or wing-sheaths of a shining green or coppery—green color, under which are 2 thin, brownish, tranparent, membranous wings. Odor strong and disagreeable.

Identification.—The entire beetle is easily identified. Its powder can be recognised by its dark-brown color, *offensive odor* and *shining particles* of *wing-sheaths.* The last two are very characteristic.

Composition.—(1) *Cantharidin,* active principle up to 1 p. c. (2) A *Volatile Oil,* giving the odor. (3) A green *Fixed Oil,* the coloring principle, allied to chlorophyll.

Action.—Rubefacient, vesicant, diuretic. *Dose.*—$\frac{1}{16}$ to $\frac{1}{2}$ gr.

Dispensing hints.—A piece of camphor kept with the fly prevents the ravages of insects.

OFFICIAL PREPARATIONS.

1. **Acetum cantharidis.** *Vinegar of Cantharides.*—1 in 10. Dark brown. Vesicant.
2. **Collodium Vesicans.** *Blistering Collodion,* Vesicant.
3. **Emplastrum Calefaciens.** *Syn B. P.—Warming Plaster.*—1 in 25 nearly. A firm yellow colored plaster. A stimulant application.

4. **Emplastrum Cantharidis.**—1 in 3 nearly. A dark brownish substance. Blisters in from 7 to 9 hours.

5. **Liquor Epispasticus.** *Blistering Liquid.*—1 in 2. A greenish brown volatile liquid. Vesicant.

6. **Tinctura Cantharidis.**—1 in 80. A pale straw colored liquid. **B.P. Dose.**—5 to 15 ms.; if frequently repeated 2 to 5 ms.

7. **Unguentum Cantharidis.**—1 in 10 nearly. Yellowish brown. Rubefacient. Milder than Emp. Cantharidis. Promotes discharge from a blistering surface.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Cantharidin.**—White crystalline scales, soluble in oils, fats, acetic acid and alcohol. A terrible poison. Is used to promote the growth of hair.

2. **Anodyne Vesicant.** Syn.—*Boni's Blister.*—Camphor 20, Chloral Hydrate 30. Melt and add cantharides 10. Digest at 150 F. for 1 hour and strain with pressure.

3. **Cantharides Lotion.**—Sp. Ammon. Arom. 2, Glycerin 1, Tr. Canthar. ½, Aq. Rosmarini to 20. Stimulates the growth of hair.

4. **Cantharides Hair Oil** (Whitla).—Ol. Rosmarini 4 drs., Liq. Epispastici 2 drs., Ol. Amygdal. Dul. 1½ ozs., Sp. Camph. 2 ozs., Glyc. Boracis 1 oz., Ol. Rosæ 8 drops, Tr. Jaborandi 1 oz. Mix. To be rubbed into the roots for the growth of hair.

5. **Potassii Cantharidas.**—In white needles soluble in water. Advocated by Liebreich in tuberculosis. *Dose.*—$\frac{1}{1300}$ to $\frac{1}{324}$ gr. hypodermically.

PHARMACOLOGY.

Externally.—Locally applied to the skin, cantharides does not show any sign of action until after 2 or 3 hours, when tingling and burning are felt on the part, soon followed by redness; referable to the irritation of the local nerves and the dilation of the local blood-vessels. Vesicles appear next which run together and form one large bleb. Hence it is an **irritant, rubefacient** and **vesicant,** but its action is slower than many others of the same class. Cantharidin is freely absorbed by the skin.

Internally. **Gastro-intestinal canal.**—Unless given in very minute doses well diluted, cantharides causes severe **irritation** of the mouth, fauces, stomach and bowels, producing burning pain in the mouth, throat, and abdomen and vomiting and purging. The vomit and the motions may contain blood. Therefore it is a most powerful **gastro-intestinal irritant.**

Urinary organs.—Cantharidin absorbed from the skin, or stomach and bowels, is slowly excreted by the kidneys, which it stimulates and acts as a **diuretic.** In large doses it causes pain in the loins, and burning and scalding in the bladder and urethra leading to **strangury, albuminuria** and **hæmaturia.** These symptoms are due to the active inflammation within the glomeruli, which spreads to the cells of the tubules until all the tubes are involved, and to the irritation of the fundus and sphincter of the bladder.

Genital organs.—It is an **aphrodisiac** (see p. 164). In large doses it inflames the genital organs and causes violent priapism and numerous seminal emissions. It produces **congestion** of the **uterus** and may bring on menstruation or abortion. It is therefore an **emmenagogue** and **ecbolic**

Metabolism.—Its effects on tissue-change are not known, but this is a fact that the urine which had been previously acid becomes sometimes alkaline after a few blisters. It is also said that blisters promote phagocytosis causing much absorption of oxygen from the increased passage of air through the lungs (Robin).

Acute toxic action.—Besides the irritant effects on the alimentary and genito-urinary tracts already described, it affects the heart, respiration and nervous system producing quickened pulse and respiration, headache, mental confusion, loss of sensibility, convulsions, dyspnœa and death.

Antidotes.—Emetics, pump, mucilaginous drinks, raw eggs. *Oils and fats should be avoided as they help the solubility of the drug.* Morphine or opium suppository, and free diluents and Sitz bath to relieve strangury.

Chronic toxic action.—Long continued small doses cause organic changes almost similar to those that occur in phosphorus poisoning.

THERAPEUTICS.

Externally.—The therapeutic indications as a counter-irritant, have been fully described in page 145, only some of the specific uses of cantharides are given below :—

1. *To increase local circulation and thereby promote local nutrition*, cantharides is used well diluted in the form of hair-lotions or hair-oils in the **falling off of hair** and **alopecia**. On the same principle it may benefit when painted on **chronic ulcers** or injected into **chronic sinuses** and **fistulæ**.

2. *To relieve pain* of **neuralgias**, blisters should be applied over the posterior branch of the spinal nerve-trunk close to the spine, for if they are put on the seat of pain, they intensify the suffering. In **sciatica** they may be used as flying blisters along the course of the nerve. If pain is caused by a localised inflammation, it is relieved by the direct application of a blister on the seat of inflammation, as in **acute articular rheumatism.**

3. *To promote absorption of morbid products*, blisters may be applied over the joints in **chronic rheumatism, synovitis** and **arthritis** ; over the chest in **pleuritic** or **pericardial effusions** ; over the abdomen in **subacute peritonitis, ovaritis, pelvic cellulitis, chronic thickening** of the **intestine** caused by dysentery, appendicitis or other affections ; over glands in indurated sympathetic **buboes** and **adenitis.**

4. *To reduce inflammation*, a blister should be applied a little away from the seat of inflammation, as in **pericarditis** and **pleuritis** in thin subjects. A counter-irritation behind the ear or high

up on the temple relieves **inflamed eye**, and on the perineum **prostatitis** or **proctitis**.

5. *To arrest spasm and reflex disturbances*, blisters over the epigastrium, are very useful in obstinate **vomiting** or **gastric cramp**; and over the pneumogastric in the neck in **whooping cough**.

6. *To produce a revulsion*, a blister may be applied over the liver in **epistaxis** or **hæmorhage** from **piles**, over the nape of the neck in **cerebral hæmorhage**, and over the heel in **sciatica**.

7. *To stimulate the central nervous system* it may be applied to the nape of the neck or to the vertex in **coma**, **narcotic poisoning**, &c.

Internally.—Cantharides is only occasionally used. As a *diuretic* it has been sometimes found useful in **cholera**. In **Bright's disease** when the active inflammation has subsided, and the kidneys are torpid, drop doses of the tincture are very useful in increasing the flow of urine and diminishing the albumen. In the same way it may be useful in **parenchymatous nephritis** due to alcoholism. As a *stimulant* to the nervo-muscular fibres of the bladder it is recommended in **chronic cystitis** or atonic condition of the bladder, especially in women or children, such as **incontinence of urine** of the aged caused by coughing, laughing or sneezing. In 1 to 2 drop doses it checks **hæmaturia**, **chordee**, **leucorrhœa** and **gleet**, but how it acts is not known. Ringer recommends 20 to 30 drops of the tincture with tincture ferri perchloridi or nux vomica in **impotence** resulting from sexual excess, self-abuse or old age. Dermatologists assert that it may successfully be given internally in **psoriasis**, **eczema**, **prurigo** and **lichen**. Potassium Cantharidinate is said to be useful in **lupus** and **laryngeal tubercle** (Liebreich).

Caution.—Cantharides blister should be avoided or very cautiously applied to children; weak, anæmic and old persons; pregnants and those who are subject to renal disease. The paralysed parts and the back of bed-ridden patients should not be blistered.

Prescribing hints.—When much absorption of the cantharidin is not desired, the cantharides plaster should only be kept on till the vesicles form (about 3 to 5 hours); when a hot poultice will help the rising of a bleb. It is generally punctured to let out the serum and dressed with cold cream or vaseline. Savine or cantharides ointment may occasionally be applied to keep up the discharge If the discharge of serum is not the object, a bleb should neither then be raised nor the vesicles punctured. Sometimes we apply **flying blisters**, *i. e.*, a series of small blisters, each not larger than a shilling or eight anna bit, kept on for about two hours in one spot, then removed and applied a few inches away for two or three hours, and so on until the affected area is covered. Before applying a blister, the skin should be thoroughly washed with soap and water and rubbed so dry with a towel as to redden it a little. The plaster sometimes requires warming before application.

One or two minims of the tincture are enough for an ordinary dose, but it must be freely diluted with mucilage or barley water.

CAOUTCHOUC. India-Rubber. N.O. *Euphorbiaceæ.*

Habitat.—Brazil, India.

Source.—The milky juice of *Hevea brasiliensis* and other species; known as pure Para rubber.

Characters.—In elastic masses, brownish-black externally, mottled with a pale tint internally. *Solubility.*—In chloroform, oil of turpentine, carbon bisulphide, benzol, petroleum spirit.

Composition.—It is polymeric with and closely related to terpenes. Combines with sulphur to form vulcanized India-rubber.

OFFICIAL PREPARATION.

1. **Liquor Caoutchouc.**—1 in 20. *Enters into.*—Charta Sinapis.

USES.

It is used for its physical properties in the preparation of protective coverings.

CAPSICI FRUCTUS. Capsicum. N.O. *Solanaceæ.*

Syn.—Small chillies. **Syn. I.V.**—*Dháni Lanká*, Beng. *Gách Mrich*, Hind.

Habitat.—Zanzibar, Sierra Leone, Nepal.

Source.—The dried fruit of *Capsicum minimum.*

Characters.—Dull orange-red, oblong-conical, obtuse, 2-celled, ½ to ¾ in. long, ¼ in. in diameter, containing 10 to 20 small flat seeds. Odor characteristic. Taste intensely pungent.

Action.—Rubefacient, stomachic, stimulant. *Dose.*—⅙ to 1 gr. in pill.

OFFICIAL PREPARATIONS.

1. **Tintura Capsici.**—1 in 20. Brandy colored. **B.P. Dose.**—5 to 15 ms. *Enters into.*—Tr. Chlorof. et Morph. Comp.
2. **Unguentum Capsici.** *Syn.—Chili paste.*—1 in 4½. A reddish colored ointment. Stimulant, rubefacient.

NON-OFFICIAL PREPARATIONS.

1. **Capsicin.** *Syn.—Oleo-Resina Capsici. U.S.P.* *Dose.*—⅛ to ¼ gr.
2. **Emp. Capsici. U.S.P.**—In myalgia and sciatica.
3. **Tr. Capsici. Fort. B.P.C.** *Syn.—Lin. Capsici.*—Capsicum 10 ozs., Alcohol 90 p.c. *q.s.* to 1½ pint. Macerate for 24 hours, then percolate. *Dose.*—1 to 3 ms. Practically it is used externally in swollen chilblains.
4. **Ung. Oleo-Resinæ Capsici. B.P.C.**—Oleo-resin 1, Yellow-Wax ½, Benzoated Lard 4, Melt and mix. A mild counter-irritant. Will bear dilution 3 to 6 times.

PHARMACOLOGY.

Externally.—The action of capsicum is like that of volatile oils, and to some extent that of cantharides. In other words, it is a powerful **irritant, rubefacient** and therefore **counter-irritant.**

Internally. **Alimentary canal.**—In small doses it stimulates the secretion of saliva and gastric juice and increases peristaltic movements. It is therefore a **sialagogue, stomachic tonic** and **carminative.** In large doses it is a **gastro-intestinal irritant.** The writer treated once a case of acute dysentery brought on by taking a large quantity of capsicum.

It is a cardiac and vascular **stimulant,** feeble **narcotic, diuretic** and **aphrodisiac.** Prof. Chéron thinks that it acts on the blood-vessels like ergot.

THERAPEUTICS.

Externally.—Like cantharides, capsicum may be used to promote the growth of hair. Its plaster may be applied in **rheumatism, lumbago** or **torticollis.** A piece of lint soaked in the infusion of the pods and covered with oiled silk may be used for the same purpose. Its tincture is a valuable remedy for chilblains.

Internally.—It is chiefly used as a condiment in India. Its tincture with tannic acid (1 dr. of each in water 10 ozs.) makes a useful gargle in **relaxed throat,** simple **tonsillitis** and chronic **pharyngitis.** It is an excellent medicine in atonic and flatulent **dyspepsia** and **dypsomania.** In the last, it not only checks the craving but stimulates and tones the gastric functions. It may induce sleep in **delirium tremens** if the cayenne pepper is given in 20 to 30 gr. doses in a bolus made with honey (Lyons). Tr. Capsicum 2 drs., Sp. Ammon. Arom. 6 drs., Sod. Bromid. 2 drs., Tr. Cinch. Co. 4 drs., Aq. Chlorof. to 8 ozs. 1/12th part every 2 or 3 hours until the craving for drink is removed. The above prescription will generally be found to be an effective "pick-me-up."

CARBO LIGNI. Wood Charcoal. (Carbon.)

Source and characters.—A black powder free from grittiness prepared by exposing wood to a red heat without access of air.

Action.—Antiseptic, absorbent, deodoriser. **B.P. Dose.**—60 to 120 grs.

PHARMACOLOGY.

Externally.—Dry charcoal absorbs and condenses gases within its pores, but more readily the oxygen, which it parts with to oxidise organic or other substances either liquid or gaseous. Hence it is a **disinfectant** and **deodoriser.** In the same way it oxidises coloring matters and is therefore a **decoloriser.** It has no action on the living organisms.

Internally.—In the stomach and intestine it absorbs and oxidises gases and irritating fluids, and thus acts as an **absorbent** and **deodorant**, but this property is lost as soon as it gets thoroughly moistened. But this does not occur so readily and some oxygen is retained in its pores, by which it may exert its influence, though in a less degree, on the gases and fluids in the intestine. Therefore, it is a gastro-intestinal **disinfectant**. In large doses it acts as a gentle **purgative** passing out with the fæces unchanged.

THERAPEUTICS.

Externally.—Since the introduction of more powerful antiseptics, charcoal is not much used now. In **phagedænic ulcers** or **gangrene** it may yet be used with advantage in the form of a charcoal poultice.

Internally.—It is often used as a **dentifrice** but it is apt to injure the enamel. It may be given in **flatulent** and **acid dyspepsia**. By removing flatulence, disinfecting fæces and diminishing reflex movements, it may be of use in **diarrhœa**. Jenner recommends it in **enteric diarrhœa**. It is an **antidote** for alkaloidal and phosphorus poisoning.

Prescribing hints.—It may be given in cachets or simply wrapped up in a wafer paper or in combination with soda and pepsin. In poisoning it must be given in table-spoonfuls. Charcoal biscuits are useless for medicinal purposes.

CARBONIS BISULPHIDUM. Carbon Bisulphide. CS_2.

Source—May be prepared by combining carbon and sulphur at a high temperature and condensing the product.

Characters.—A clear, colorless, highly refractive liquid; odor characteristic. Sp. gr. 1·268 to 1·269. *Solubility.*—1 in 500 of water, readily in alcohol, ether, chloroform, &c. *Impurities.*—Sulphur, sulphuretted hydrogen.

Enters into.—Liq. Caoutchouc and Pil. Phosph.

ACTIONS AND USES.

In pharmacy it is used to dissolve India rubber and phosphorus. It is an active poison, an antiseptic, and an anæsthetic like chloroform when inhaled.

CARDAMOMI SEMINA. Cardamom Seeds. N.O. *Scitamineæ.*

Syn. I.V.—*Eláchi*, Beng.

Habitat.—Guzerat, Malabar, Ceylon.

Source.—The dried ripe fruits of *Elettaria Cardamomum.* The seeds should be kept in their pericarps and separated when required for use.

Characters.—Commonly known.

Composition.—(1) A *Volatile Oil*, containing a terpene called terpenene. (2) A *Fixed Oil.* The pericarp is inactive medicinally.

Action.—Carminative, antispasmodic. *Dose.*—5 to 10 grs.

Enters into.—Ext. Colocyn. Co., Pulv. Cinnam. Co., Pulv. Cretæ Arom., Tr. Gent. Co., Tr. Rhei Co. and the

OFFICIAL PREPARATION.

Tinctura Cardamomi Composita.—1 in 80. Deep red color. **B.P. Dose.**—½ to 1 dr. *Enters into.*—Decoc. Aloes Co. and Mist. Sennæ Co.

NON-OFFICIAL PREPARATIONS.

1. **Oleum Cardamomi.**—A pale aromatic volatile oil.
2. **Tr. Carminativa. B.P.C.**—Cardamom Seeds 600 grs., Stronger Tincture of Ginger 1½ ozs., Oils of Cinnamon, Caraway and Cloves each 100 ms., Alcohol 90 p.c. *q.s.* By maceration to 1 pint for a week and dissolving the oils in tinctures. Maceration may be avoided by substituting 24 ms. of oil for the seeds. A flavoring agent. *Dose.*—2 to 10 ms.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Cardamom seed is a **stimulant, stomachic** and **carminative** and is therefore useful in flatulence and in correcting the griping property of purgatives. Its tincture is a coloring and flavoring agent.

CARUI FRUCTUS. Caraway Fruit. N.O. *Umbelliferæ.*

Syn. I.V.—*Jirá*, Beng. *Shia-Jirá*, Hind.

Habitat.—Europe, India.

Source.—The dried fruit of *Carum Carvi.*

Characters.—Mericarps separate ; each $\frac{1}{6}$ to $\frac{1}{4}$ in. long, $\frac{1}{25}$ in. broad ; brown with paler ridges, slightly curved, tapering, glabrous. Odor aromatic. Taste aromatic, agreeable.

Identification.—It resembles Conium and Fennel. Caraway has small ridges and a spicy taste.

Composition.—(1) The *Volatile Oil* (*off.*)

Action.—Stimulant, antispasmodic, carminative.

Enters into.—Conf. Pip., Pulv. Opii Co., Tr. Card. Co., Tr. Sennæ Co. and the

OFFICIAL PREPARATIONS.

1. **Aquæ Carui.**—1 in 10. *Dose.*—1 to 2 ozs.

2. **OLEUM CARUI.** Oil of Caraway.

Source.—The oil distilled from caraway fruit.

Characters.—Colorless or pale yellow, having the odor and taste of the fruit. Sp. gr. 0·910 to 0·920.

Composition.—(1) *Carvone.* (2) *Carvol.* (3) *Limonene.* (4) *Cymene.* (5) *Cuminol.*

Enters into.—Pil. Aloes Barb. **B.P. Dose.**—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses are the same as those of Anethi Fructus (see p. 237).

CARYOPHYLLUM. Cloves. N.O. *Myrtaceæ.*

Syn. I. V.—*Labanga*, Beng. *Long*, Hind.

Habitat.—Zanzibar, Penang, Bancoolen, &c.

Source.—The dried flower-buds of *Eugenia Caryophillata.*

Characters.—⅝ in. long, dark-brown, wrinkled, sub-cylindrical; calyx which tapers below is surmounted by 4 thick, rigid, patent teeth, between which are 4 paler imbricated petals enclosing stamens and a single style. Odor strong spicy. Taste pungent, aromatic. *Should emit oil when indented with the finger nail.*

Composition.—(1) *Volatile Oil* (*off.*) 18 p. c. (2) *Eugenin*, a crystalline substance. (3) *Caryophyllin*, a neutral body isomeric with camphor. (4) *Gallo-Tannic Acid.* (5) *Gum*, &c.

Action.—Carminative, stimulant, aromatic, tonic.

Enters into.—Inf. Aurantii Co., Pulv. Cretæ Arom. and the

OFFICIAL PREPARATIONS.

1. **Infusum Caryophylli.**—1 in 40 (¼ hour). **B. P. Dose.**—½ to 1 oz.

Incompatibles.—Lime water, iron salts, mineral acids and gelatin.

2. **OLEUM CARYOPHYLLI.** Oil of Cloves.

Source.—Distilled from cloves.

Characters.—Colorless or pale when recent, becoming reddish-brown gradually. Sp. gr. not below 1·050.

Composition.—(1) *Eugenol*, chemically resembling phenol. (2) *Acetyl-eugenol.* (3) *Caryophyllene*, a hydrocarbon.

Enters into.—Pil. Coloc. Co., Pil. Coloc. et Hyosc. **B.P. Dose.**—½ to 3 ms.

PHARMACOLOGY.

Externally.—The oil of cloves acts like camphor, but causes more tingling, smarting, warmth and redness followed by anæsthesia. It is therefore a local **stimulant, rubefacient, counter-irritant** and **anæsthetic.** It is also a **parasiticide** and **antiseptic.**

Internally. **Mouth.**—The local action of the oil of cloves on the mouth is the same as on the skin. It reflexly stimulates the **secretion** of **saliva** and **mucus** by exciting the peripheral nerves, and **sharpens** the **taste** by stimulating the nerves of taste and smell. Simultaneously, the gastric circulation is reflexly excited with increased flow of the gastric juice.

Stomach.—Reaching the stomach it directly **stimulates** the **nerves** and **blood-vessels** of the stomach, thereby **accelerating** the **secretion** of the **gastric juice** and **stimulating** the **peristaltic movements.** It is therefore a **stomachic tonic** and **carminative.** Like camphor or alcohol, it also reflexly **stimulates** the **heart** and moderately increases the rate and force of the pulse.

Intestine.—Some of the oil finding its way into the bowels produces the same action there as on the stomach, causing increased circulation, increased secretion, increased peristalsis and increased expulsion of flatus, but no absorption of gases (Brunton), relieving any spasm, if present. Hence it is an **intestinal antispsmodic.**

Heart, blood and Circulation.—It enters the blood unchanged and is partly oxidised by the red blood corpuscles. It increases the **number of white corpuscles.** The heart may be stimulated to a slight extent by its direct action on it, but chiefly by the reflex action from the stomach. By temporarily exciting the cerebral, medullary and spinal centres either directly through the circulation, or, as is generally the case, reflexly from the stomach, it increases the functional activity of the organs and relieves spasmodic contractions of the various parts of the body. Therefore it is a feeble **general stimulant** and **general antispasmodic.**

Elimination.—The oil of cloves, like other volatile oils, is eliminated by the kidneys, genito-urinary tract, skin, bronchial mucous membrane, liver and probably the bowels. In its passage through, it **stimulates** and **disinfects** their **secretions** but not so powerfully as turpentine or many other volatile oils.

The above pharmacology will apply more or less to almost all the volatile oils.

THERAPEUTICS.

Externally.—On account of its high price the oil of cloves cannot be freely used. Occasionally it is applied as an *anodyne* in superficial **neuralgias.** Very often it is employed for flavoring hair-oils and liniments.

Internally.—Cloves are generally used in cookery to improve flavor, and with aromatic bitters, as Inf. Auran t. Co., to stimulate appetite and digestion. The oil relieves **toothache** when put within the decayed tooth. It is an excellent remedy for **intestinal colic** and **flatulence.** It may be combined with purgatives to prevent their griping.

Prescribing hints.—The oil is best given on a lump of sugar, or triturated with sugar as *elæosacchara* (see p. 68), or suspended by mucilage.

CASCARA SAGRADA. Cascara Sagrada. N.O. *Rhamneæ.*

Syn. B.P.—Rhamni Purshiani Cortex, Sacred Bark.

Habitat.—California.

Source.—The dried bark of *Rhamnus purshianus* (California buckthorn).

Characters.—In quilled or flat pieces, 4 in. long, $\frac{3}{4}$ in. wide, $\frac{1}{16}$ in. thick. Cork smooth, purplish-brown, almost covered with lichens. Inner surface reddish-brown, longitudinally striated. Odor characteristic. Taste nauseous, bitter.

Composition.—(1) *Cascarin*, a neutral principle. (2) *Three Resins*,—red, yellow and brown. (3) *Acids*,—tannic, malic and oxalic. (4) A *Volatile Oil.*

Action.—Tonic, laxative, cholagogue.

OFFICIAL PREPARATIONS.

1. **Extractum Cascaræ Sagradæ.**—A dry extract. **B.P. Dose.**—2 to 8 grs.
2. **Extractum Cascaræ Sagradæ Liquidum.**—1 in 1. Black. **B.P. Dose.**—½ to 1 dr.
3. **Syrupus Cascaræ Aromaticus.**—1 in 2½. **B.P. Dose.**—½ to 2 drs.

NON-OFFICIAL PREPARATION.

1. **Ext. Cascar. Sag. Liq. Inspid. B.P.C.**—*Dose*—½ to 2 drs.

PHARMACOLCGY.

Internally. **Gastro-intestinal canal.**—In small doses (5 to 10 ms. of the liquid extract), cascara has a decidedly **tonic effect** on the stomach, promoting appetite and helping digestion. In moderate doses (½ to 1 dr.) it gently stimulates the glandular secretion, but markedly the peristalsis. Hence it is a **laxative**, producing healthy, copious and bilious stools, for it is also a **hepatic stimulant**. In large doses it is a gastro-intestinal **irritant**.

THERAPEUTICS.

Internally.—Cascara is the most valuable *aperient* we have for **habitual** and **chronic constipation**, due to the torpidity either of the liver or of the intestine. The dose ought to be so regulated as to produce a soft, painless, natural motion every morning, and when the desired end is gained, it should then be gradually reduced. The great advantage of the drug is that its dose does not require to be increased to maintain its action. However, for the successful cure of constipation it must be continued for at least 2 or 3 months.

Prescribing hints.—The solid extract is best given in pills alone or with nux vomica and aloes. The nauseous taste of the liquid extract may be concealed by aromatics and glycerin, or aromatics and chloroform. The plain aromatic syrup is not an unpleasant vehicle. The aromatic syrup of cascara is a pleasant preparation. The uncertainty of its action is sometimes most annoying to the physician. This chiefly arises from using the inferior bark or the barks of allied species in pharmacy.

CASCARILLA. Cascarilla. NO. *Euphorbiaceæ.*

Habitat.—Bahamas Islands.

Source.—The dried bark of *Croton Eluteria.*.

Characters.—In quills, 1 to 3 in. long, ⅙ to ½ in. in diameter, or in small curved pieces. Externally dull-brown or dark-grey, longitudinally wrinkled, covered with silvery grey patches and black dots. Fracture short, resinous. Odor agreeable, aromatic, especially when burned. Taste aromatic, bitter.

Identification.—It resembles pale Cinchona Bark, which is smooth, small and less white.

Composition.—(1) *Cascarillin*, a white inodorous crystalline alkaloid. (2) *Betaïne.* (3) *Tannic Acid.* (4) *Volatile Oils.* (5) *Starch.* (6) *Resins.*

Incompatibles.—Mineral acids, lime water, metallic salts.

Action.—Aromatic, bitter tonic.

OFFICIAL PREPARATIONS.

1. **Infusum Cascarillæ.**—1 in 20 (¼ hour). Decomposes in hot weather. **B.P. Dose**—½ to 1 oz.
2. **Tinctura Cascarillæ.**—1 in 5. **B. P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Internally.—Cascarilla belongs to the group of aromatic bitters, and therefore possesses the combined properties of pure bitters and aromatic oils. It is therefore an **aromatic, stomachic tonic,** and **carminative.** Some say it is a feeble febrifuge.

THERAPEUTICS.

Internally.—It is not unpleasant to take. It is often given in combination with other bitters in flatulent or atonic dyspepsia, and as a *stomachic tonic* after febrile diseases. The bark may be used as a **substitute for tobacco** to wean heavy smokers.

Prescribing hints.—The infusion will scarcely keep good for a day in the summer unless mixed with an aromatic tincture. The diluted mineral acids precipitate the resin when given with the tincture, but the addition of the infusion to a certain extent prevents it.

CASSIÆ PULPA. Cassia Pulp. N. O. *Leguminosæ.*

Syn. I.V.—*Sondaler átá*, Beng. *Amaltás*, Hind.

Habitat.—East and West Indies.

Source.—The pulp obtained from the pods of *Cassia Fistula.*

Characters.—The *pulp* viscid, nearly black, with a faint odor and sweet taste. The *pods* 1½ ft. to 2 ft. long, ¾ to 1 in. in diameter, cylindrical, shortly stalked, blackish-brown, divided internally by transverse partitions into numerous cells, each containing a seed surrounded by pulp.

Composition.—(1) A *Purgative Principle*, allied to cathartic acid. (2) *Sugar.* (3) *Pectin.* (4) *Mucilage.*

Action.—Laxative. *Dose.*—60 to 120 grs. as a laxative ; 1 to 2 ozs. as a purgative.

Enters into.—Conf. Sennæ.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The cassia pulp is never given alone on account of its griping property but with senna in the form of a confection.

CATECHU. Catechu. N. O. *Rubiaceæ.*

Syn. B.P.—Catechu Pallidum. **Syn. I.V.**—*Khayer*, Beng. *Kath*, Hind.

Habitat.—Singapore, Eastern Archipelago.

Source—An extract of the leaves and young shoots of *Uncaria Gambier.*

Characters.—In cubes, sometimes agglutinated. Each 1 in. deep, reddish-brown externally, pale cinnamon-brown internally, porous, friable. Taste at first bitter and astringent, then sweetish. No odor. *Solubility.*—Entirely in boiling water, 75 p.c. in alcohol 90 p.c. *Impurities.*—Earthy matter and starch.

Composition.—(1) *Catechu-tannic Acid*, the active principle which is converted into catechin by boiling or by saliva. (2) *Catechin* or *Catechuic Acid.* (3) *Pyrocatechin* or *Catechol*, which gives a green color with ferric chloride.

Incompatibles.—Alkalis, metallic salts, gelatin.

Action.—Powerfully astringent. **B.P. Dose.**—5 to 15 grs.

OFFICIAL PREPARATIONS.

1. **Pulvis Catechu Compositus.**—1 in 2½. **B.P. Dose.**—10 to 40 grs. 2 to 5 grs. for a child 1 year old. Stock it in a stoppered bottle.
2. **Tinctura Catechu.**—1 in 5. A rich coffee-brown liquid. **B.P. Dose**—½ to 1 dr. 5 to 10 ms. for a child 1 year old.
3. **Trochiscus Catechu.**—1 gr. in each. In sore throat. *Dose.*—1 to 6.

CATECHU NIGRUM. Black Catechu. N.O. *Leguminosæ.*

(*Ind. and Col. Addendum.*)

Habitat.—India and Burma.

Source.—An extract prepared from the wood of *Acacia Catechu.*

Characters.—In irregular masses of a dark-brown color. *Solubility.*—Partially in cold, freely in boiling water.

Actions and Doses.—The same as those of catechu.

Black catechu may be used in making official preparations for use in India, Eastern Colonies and North American Colonies.

PHARMACOLOGY AND THERAPEUTICS.

Internally—Both the pale and the black catechu are **non-irritating astringents**, acting like tannic acid which they contain. It is a valuable *local astringent* and may be used in the form of a dentifrice, gargle, or lozenge in **sponginess** of the **gums**, **mercurial** and **ulcerative stomatitis**, and **relaxed throat**. The natives of India suffer less from the diseases of the mouth and the gums because of their habit of chewing *prepared pán* (see p. 273), which contains alkaline, astringent (catechu) and antiseptic substances. It is a very useful medicine for **diarrhœa** and early stages of **cholera**, being often prescribed with opium, kino and chalk (see p. 291).

CERA FLAVA.—Yellow Beeswax. N. O. *Hymenoptera.*

Syn. I.V. *Mom*, Beng. Hind.
Habitat.—Britain and other countries.
Source.—Prepared from the honeycomb of the Hive-Bee, *Apis Mellifica.*

Characters.—Firm, yellowish. Odor agreeable, honey-like. Not unctuous to touch. *Solubility.*—Entirely in hot oil of turpentine, partially in alcohol 90 p.c. *Impurities.*—Starch, paraffin, &c.

Composition.—(1) *Myricin* (myricyl palmitate). (2) *Cerotic Acid.*

Enters into.—Cera Alb., Emp. Calefac., Emp. Canth., Emp. Picis, Ung. Hyd. Co., Ung. Menthol, Ung. Picis Liq., Ung. Resinæ, and Ung. Staphisagriæ.

CERA ALBA. White Beeswax.

Source and **Characters.**—In white translucent masses or cakes made by bleaching yellow wax by exposure to moisture, air and light.

Enters into.—Pil. Phosph., Supposit. Acid. Carbolic., and Ung. Aqua Rosæ.

ACTIONS AND USES.

They are chiefly used as a basis for plasters and ointments. If the basis of the latter becomes too soft on account of the prevailing high temperature, extra white beeswax or yellow beeswax may be added to render it more suitable for use.

CERII OXALAS. Cerium Oxalate. $Ce_2(C_2O_4)_3, 9H_2O$.

Source and **Characters.**—A white granular powder insoluble in water, obtained by the interaction of a soluble cerium salt and a soluble oxalate. *Impurities.*—Lanthanum oxalate, didymium oxalate, arsenium, iron, aluminium, zinc, calcium, &c.

Action.—Gastric sedative. **B.P. Dose.**—2 to 10 grs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is a **gastric sedative**, but how it acts is not known. It is said to be efficacious in **chronic cough**, and is recommended in **sea-sickness** and **vomiting of pregnancy** with doubtful results.

Prescribing hints.—The writer has given it in 15 to 20 gr. doses every 3 or 4 hours without much effect. It may be given in cachets, pills or suspended in water.

CETACEUM. Spermaceti. N. O. *Cetacea.*

Habitat.—Pacific and Indian Oceans.

Source.—A concrete fatty substance, obtained, mixed with oil, from the head of the sperm whale, *Physeter macrocephalus.* It is separated from the oil by filtration and pressure, and is afterwards purified.

Characters.—In crystalline, pearly-white, glistening, translucent masses with little taste and no odor. Reducible to powder by means of a little alcohol 90 p.c. *Solubility.*—In ether, chloroform, boiling alcohol 90 p c., not in water.

Composition.—(1) *Cetin*, a fat formed by the combination of citylic alcohol with palmitic acid.

Enters into.—Ung. Aquæ Rosæ, Ung. Capsici and the

OFFICIAL PREPARATION.

1. **Unguentum Cetacei.**—1 in 5. An emollient and cooling dressing for blistered surfaces and sores. Benzoin is unsuited when used for eye or for piles.

USES.

It is chiefly used as a basis for ointments and cerates.

CHIRATA. Chiretta. N. O. *Gentianaceæ.*

Syn. I.V.—*Chiretá* Beng. *Chirayatá*, Hind. *Bhunimba*, Sans.

Habitat.—Northern India.

Source.—The dried plant, *Swertia Chirata*, collected when in flower.

Characters.—*Stem* 3 ft. or more, long, smooth, brown, winged, branched above, rounded below. *Branches* slender, decussate. *Leaves* opposite, ovate, glabrous, entire. *Flowers* small, numerous panicled. *Fruits* superior, bicarpellary, unilocular. No odor. Taste extremely bitter. *Impurities.*—*Ophilia augustifolia* (sweet chiretta), *O. alata*, *Andrographis paniculata*, &c. The last is sometimes erroneously called Indian chiretta.

Identification.—It resembles somewhat *Lobelia*, which is not bitter.

Composition.—(1) *Chiratin*, an active amorphous bitter principle in combination with (2) *Ophelic Acid.* No tannic acid.

Action.—Bitter tonic, stomachic.

OFFICIAL PREPARATIONS.

1. **Infusum Chiratæ.**—1 in 20 (¼ hour). **B.P. Dose.**—½ to 1 oz.
2. **Liquor Chiratæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Chiratæ.**—1 in 10. Tea-colored. **B.P. dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Essence of Chiretta.**—As sold in Calcutta, it is an aromatic liquid extract. *Dose.*—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Being a pure, non-astringent bitter, its actions and uses resemble those of calumba (*q. v.*), but it has some influence on the liver. It is particularly useful in **indigestion** with **torpidity** of the **liver** and **bowels**, and after **alcoholism**. It can be given with iron. Often it is combined with nitro-hydrochloric acid dilute.

CHLORAL HYDRAS. Chloral Hydrate.

Trichlorethylidene Glycol. $CCl_3.CH(OH)_2$.

Source.—Obtained by the addition of water to the liquid chloral produced by the action of dry chlorine gas on ethylic alcohol.

Characters.—In colorless, monoclinic plates. Odor pungent, not acrid. Taste pungent, bitter. *Solubility.*—Freely in water, alcohol 90 p.c., ether and chloroform. *Impurities.*—Free chlorides, hydrochloric acid, chloral alcoholate and oily matters.

Identification.—The shape and size of the crystals and the peculiar penetrating odor help recognition. The crystals of butyl-chloral hydrate are smaller though they possess somewhat similar smell.

Incompatibles.—Alkaline substances which liberate chloroform.

Action.—Hypnotic. **B.P. Dose.**—5 to 20 grs. *M. S. Dose.*—40 grs. *Daily Dose.*—90 grs.

OFFICAL PREPARATION.

1. **Syrupus Chloral.**—10 grs. in 1 dr. **B.P. Dose.**—½ to 2 drs.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Suppositoria Chloral.**—5 grs. in each. See p. 97.
2. **Chloral c. Camphoratum. B.P.C.**—1 in 1. Rub together in a warm mortar until liquefied. An effective local anodyne.
3. **Liq. Bromo-Chloral Comp. B.P.C.**—See p. 279.
4. **Chloralamide.** *Syn.—Chloral Formamide.* P.G.—Bitter shining crystals soluble in water. Hypnotic not analgesic. It does not weaken the heart nor tend to form a habit like chloral. *Dose.*—15 to 45 grs.
5. **Chlorobrom.**—Contains chloralamide 30 grs. and potassium bromide 30 grs. in 1 oz. flavored with liquorice. *Dose.*—½ to 1 oz.
6. **Chloralose.** *Syn.—Anhydro-gluco-chloral.*—Small white crystals prepared by acting chloral on glucose. Induces dreamy sleep. Not a safe hypnotic. *Dose.*—3 to 10 grs.
7. **Hypnal.**—A compound of chloral and antipyrine. A sedative hypnotic useful in cases where there is a cough or pain. Contra-indicated in cardiac affections. *Dose.*—15 to 20 grs.

PHARMACOLOGY.

Externally.—In a concentrated form it is an **irritant** and **vesicant**. The diluted solution is **antiseptic**.

Internally. **Alimentary canal.**—In large doses chloral hydrate is a **gastro-intestinal irritant**. In medicinal doses well diluted it is not so.

Blood.—It is readily absorbed and circulates unchanged. It is not converted into chloroform and formic acid by the alkalis in the blood, as was originally thought by Liebreich.

Heart and **circulation.**—Large doses markedly **depress** the **heart** and finally arrest it in diastole. This is due to its direct action on the **cardiac muscle**. The pulse after a brief excitement becomes slow, feeble and intermittent. The **vaso-motor**

centre is also **depressed**, causing **dilatation** of the **blood-vessels**. As a consequence of these actions, the **blood-pressure** is considerably **lowered**.

Respiration.—In moderate doses no effect on respiration is observed, but in toxic doses the breathing becomes slower, shallower and irregular, and finally stops with the simultaneous arrest of the heart.

Temperature.—Chloral hydrate tends to lower the body-heat, but in toxic doses there is a marked **diminution** of the **temperature**, due to (1) the dilated condition of the peripheral vessels and (2) the diminished production of heat in the muscles.

Cerebrum.—In moderate doses after a transitory excitement, it induces a sort of soothing drowsiness soon followed by refreshing sleep indistinguishable from natural slumber; without producing any bad after-effects, such as headache, drowsiness or sickness. Hence it is a pure **hypnotic**. It induces sleep in two ways:—(1) directly by lessening the activity of the brain-cells, and (2) indirectly by dilating the vessels throughout the body and somewhat lessening the force of the heart. Larger doses cause prolonged sleep leading to **coma**. The **pupils** are **contracted** by small doses and in large doses they first contract then dilate.

Spinal cord.—The **anterior cornua** are first **stimulated** then **powerfully depressed**, causing **loss** and **paralysis** of the **reflex excitability**. Probably it acts first on the grey matter, as painful impressions are not felt when reflex excitation can still be induced (Brunton).

(1) *Motor nerves* and *muscles* are not affected directly.

(2) *Sensory nerves* are not affected unless given in very large doses, when there is an **anæsthesia**.

Thus, it will be seen that chloral hydrate is a **powerful depressant** to (*a*) the *cerebrum*, (*b*) the *respiratory centre*, (*c*) the *vaso-motor centre*, (*d*) the *anterior cornua of the cord*, (*e*) the *heart*, and (*f*) possibly the *thermogenitic centre* (?).

Kidneys.—It escapes partly unchanged, but chiefly as urochloralic acid. Large doses cause nephritis and bloody urine. There may be sugar in the urine.

Elimination.—It escapes chiefly by the kidneys and partly by the lungs and skin.

Acute toxic action.—Acute poisoning is rare. The writer has seen only one case—a habitual drunkard who died after taking 80 grs. Profound sleep sinking into deep coma; lividity of the face; pallor; cold sweat over the forehead and hands; slow, labored and afterwards shallow and feeble breathing; frequent, feeble, irregular and afterwards lost pulse; *marked fall of temperature*, which may be so great as to alone cause death (Brunton); contracted and afterwards dilated pupils; and absolute muscular relaxation, are the chief symptoms. Death taking place from the paralysis either of the heart or of the respiratory centre.

Antidotes.—Emetics or pump. Friction; external warmth; stimulants, such as ammonia, ether, &c.; sinapisms over the chest and nape of the neck ; electricity ; amyl nitrite inhalation ; atropine, strychnine, caffeine hypodermically. The patient if roused should not be allowed to sleep. A pint of strong coffee may be injected into the rectum as recommended by Murrell.

Chronic toxic action or **Chloralism**.—Craving for chloral is soon generated in those who are addicted to its use. Gastro-intestinal disturbance ; cutaneous eruption, such as erythema, pustules, vesicles, &c. ; bodily and mental weakness ; sudden flushing ; dyspnœa and palpitation are prominent symptoms. Death often results from an over-dose of what the habitué is accustomed to take. The best treatment is the gradual withdrawal of the daily dose with generous diet, fresh air, tonics and nervine sedatives, such as hyoscyamus.

Physiological antagonistis.—Atropine, strychnine, physostigmine, picrotoxin.

THERAPEUTICS.

Externally.—As a *vesicant* the powdered chloral hydrate may be sprinkled over a gently warmed adhesive plaster and applied. It produces an effective painless blister. As a *local anodyne* Chloral c. Camphor or Chloral c. Menthol may be painted over superficial **neuralgic areas**, and applied within **carious painful teeth**. By dissolving morphine or cocaine in any of them, the efficacy may be greatly augmented. A lotion (8 grs. to 1 oz.) is an antiseptic, anodyne, stimulating application to **unhealthy** or **foul ulcers**, and may cure **eczema**.

Internally.—As a *pure and simple hypnotic* it is unrivalled in **sleeplessness** due to worry, overwork or old age, but not to pain. In 15 to 20 grs. it induces a refreshing sleep, which thus obtained not infrequently leads to the repeated use of the drug, and thereby induces a **chloral-habit**. It is very efficacious in **febrile insomnia** in the early stages, but must be given cautiously in later stages when there is a danger of cardiac weakness. It is a most valuable remedy for **delirium tremens** following an occasional spree. 20 to 30 grs. of chloral with the same quantity of potassium bromide twice or thrice daily are enough to check it in the beginning. But it must be continued very cautiously lest it should produce fatal results by depressing the heart already weakened by alcoholic excesses. In the same manner it may be given in **mania** puerperal or otherwise. It is much extolled in **sea-sickness** and **vomiting** of **pregnancy**. As a *depressant to the motor tract of the cord and a paralyser of the reflex excitability*, it is a very valuable drug in convulsive diseases, particularly in **puerperal eclampsia**, **tetanus**, **strychnine-poisoning**, **hydrophobia**, **tetanus neonatorum** and **infantile convulsions**, when given with bromides. An addition of a few drops of the tincture of Indian hemp to the chloral and bromide mixture has given very satisfactory results in tetanus in the writer's hands. Many other spasmodic affections, such as **chorea**, **asthma**, **whooping cough**, **paralysis agitans**,

spasmodic intestinal colic are benefited by it. It is an excellent medicine for lessening the **rigidity** of the **os** and other soft parts during parturition. It does not affect the uterine contractions. Chloral hydrate subcutaneously injected (5 to 10 grs.) removes cramps and coldness of breath in **cholera**, but the injection causes burning inflammation and sometimes suppuration. As a *general anodyne* it is far inferior to morphine, though it may relieve milder attacks of **neuralgias** except that of the fifth nerve (see butyl-chloral hydrate), of **urinary, biliary** and **intestinal colics**; and of **gastrodynia**. By referring to the following table, the student will be better able to understand the differential actions and uses of chloral hydrate and morphine—

Chloral Hydrate.	Morphine.
1. A quicker, a more certain and a more refreshing hypnotic.	A slower, a more uncertain and a less refreshing hypnotic.
2. No after-effects, such as headache, depression and sickness. (Sometimes heaviness or sleepiness only.)	Always headache, confusion and narcotism.
3. No constipation. No gastro-intestinal derangement in medicinal doses.	Always constipation, and sometimes nausea.
4. Cannot relieve excessive pain nor induce sleep in insomnia caused by it.	Can relieve pain and induce sleep in insomnia caused by it.
5. Cannot relieve reflex cough, but can relieve convulsive diseases.	Can relieve reflex cough, but cannot relieve convulsive diseases.

Caution.—Being a powerful cardiac depressant, it should be given with great caution to old, gouty, rheumatic, hysteric, delicate, and otherwise constitutionally weak persons. It should not be given to confirmed drunkards. It is contra-indicated in diseases of the heart, blood-vessels and lungs, and in nephritis. In a person susceptible to its action, small doses (10 to 15 grs.) may sometimes produce redness of the eyes and swelling of the conjunctivæ.

Prescribing hints.—The aromatic or ginger syrup best covers its pungent taste. It may be given by the rectum (see p. 97) or subcutaneously (see above).

CHLORUM. Chlorine. Cl. (*Non-official.*)

This gas is officially obtained from Calx Chlorinata and Liquor Sodæ Chlorinatæ. Acidum Nitro-hydrochloricum dilutum contains also free chlorine.

CALX CHLORINATA. Chlorinated Lime. $CaCl_2$, $CaCl_2O_2$.

Syn.—Bleaching powder.

Source.—Obtained by exposing slaked lime to chlorine gas until absorption ceases. Should contain not less than 33 p.c. of chlorine. $2CaH_2O_2 + 2Cl_2 = CaCl_2O_2, CaCl_2 + 2H_2O$.

Characters.—A dull white powder with a characteristic smell. Becomes moist and gradually decomposes on exposure to air. *Solubility.*—Partially in water.

Dispensing hints.—It should be preserved in well-stoppered bottles.

Enters into.—The preparation of chloroform and the

OFFICIAL PREPARATION.

1. **Liquor Calcis Chlorinatæ**.—1 in 10. Yields when fresh 3 p.c. of Cl. Antiseptic, deodoriser. Preserve it in a stoppered bottle in a cool and dark place.

LIQUOR SODÆ CHLORINATÆ. $NaCl,NaClO$.

Syn.—Labarraque's disinfecting fluid.

Source and **Characters**.—A colorless alkaline liquid with an astringent taste and odor of chlorine, obtained by mixing a solution of sodium carbonate with one of chlorinated lime. $CaCl_2O_2,CaCl_2 + 2Na_2CO_3 = (NaCl,NaClO)_2 + 2CaCO_3$.

Dispensing hints.—Preserve it in a stoppered bottle in a cool and dark place.

Action.—Antiseptic, disinfectant. **B.P. Dose**.—10 to 20 ms.

NON-OFFICIAL PREPARATION OF CHLORINE.

1. **Liquor Chlori**. (Burney Yeo).—Put powdered potassium chlorate 30 grs. in a 12 oz. bottle and pour on it strong hydrochloric acid 1 dr., cork, shake and allow gas to generate, then fill little by little with water. Add to this solution 24 to 36 grs. of quinine and 1 oz. of syrup of orange peel. *Dose.*—1 oz. every 2, 3 or 4 hours in typhoid fever.

PHARMACOLOGY.

Externally.—Chlorine has a great affinity for hydrogen, and consequently decomposes chemical and organic compounds which contain it, such as, ammonia, sulphuretted hydrogen, and many organic matters. It also destroys putrefactive and septic germs. Hence it is a powerful **disinfectant** and **deodorant**. Applied to the skin for a long time, as in the case of workmen in a manufactory of bleaching powder, it causes itching, redness and inflammation leading even to vesication or sloughing. Inhaled in a concentrated form it is a powerful irritant to the respiratory passages and may cause death from spasm of the glottis or inflammation of the air-passages. Inhaled greatly diluted with air, it is a stimulating **expectorant**.

Both the chlorinated lime and chlorinated soda are powerful **disinfectants** and **deodorisers**, because they give off hypochlorous acid—an active oxidising agent. Being unstable the acid is soon decomposed and sets free chlorine and oxygen. The former greedily attacks hydrogen, and the latter the oxidisable constituents, of many chemical and organic substances with which they may come in contact.

Internally.—It exerts the same local influence on the parts with which it comes in contact, until decomposed into chlorides in the stomach, when it loses its virtues as an uncombined element.

THERAPEUTICS.

Externally.—As a *disinfectant* and *deodorizer*, chlorinated lime is often poured into drains, privies, urinals, bed-pans, &c. Moistened with water it may be put in saucers in different parts of a sick-room to disinfect its air. If the room requires a speedy disinfection, chlorine gas may be quickly generated by pouring sulphuric acid on salt and black oxide of manganese; the room being closed up for 24 hours (see p. 201). The chlorine thus liberated attacks hydrogen of the ammonia and sulphuretted hydrogen present in the air of the room.

As a *stimulating antiseptic application*, chlorine water or a solution of chlorinated lime or of chlorinated soda may be used in **wounds** and **ulcers** which have a fetid discharge or a tendency to slough. They are also useful for injecting into **cavities** with **foul discharges**, as in puerperal fever, abscesses giving off fetid gases, and ozæna.

As a *parasiticide* any of the solutions may be found useful in **ringworm** and **scabies.**

Internally.—In **malignant sore-throat, diphtheria, mercurial salivation,** and **sloughing stomatitis,** either of the solutions may be used with advantage as a gargle ($\frac{1}{2}$ to 1 dr. to 1 oz.). A solution of chlorine is recommended in septic diseases, such as **typhoid fever** and **septicæmia**, but the results are not encouraging. Burney Yeo's chlorine mixture has not proved successful in the writer's hands, though it relieves flatulence.

CHLOROFORMUM. Chloroform. Trichloromethane. $CHCl_3$.

Source.—May be prepared by heating a mixture of chlorinated lime, slaked lime, ethylic alcohol and distilled water. Sufficient absolute alcohol is added to make the sp. gr. 1·490 to 1·495.

Characters.—A limpid, colorless, heavy, volatile liquid; not inflammable. Odor sweet, penetrating. Taste sweet, pungent. *Solubility.*—1 in 200 of water, 10 in 7 of alcohol 90 p. c., freely in ether and most fixed and volatile oils. Chloroform dissolves caoutchouc, mastic, elemi, tolu, benzoin, copal, iodine, organic alkaloids, &c. *Impurities.*—Hydrocarbons, non-volatile compounds including chlorides left after evaporation; carbonyl chloride from age and exposure to light; free acids; free chlorine.

Tests for purity.—(1) It should neither turn blue litmus paper red (absence of acids); (2) nor produce a white precipitate except a slight opalescence with $AgNO_3$ (absence of chlorides); (3) nor afford any color with cadmium iodide and starch (absence of chlorine); (4) nor a yellow color with H_2SO_4 (absence of hydrocarbons); (5) nor any residue and unpleasant odor after evaporation; and (6) nor a change of color with potash (absence of aldehydes).

Identification.—It is made out by its characteristic *smell*, weight and volatility (see Ether, 206).

Dispensing hints.—It should be kept in blue or amber colored stoppered bottles in a cool and dark place, as light and air combined help its decomposition.

Action.—Anæsthetic, sedative, carminative, antispasmodic, rubefacient, anodyne. **B.P. Dose.**—1 to 5 ms.

OFFICIAL PREPARATIONS.

1. **Aqua Chloroformi.**—¼ m. in 100. Powerfully antiseptic. *Dose.*—½ to 2 ozs.
2. **Linimentum Chloroformi.**—1 in 2. Rubefacient and anodyne.
3. **Spiritus Chloroformi.** *Syn.—Chloric Ether, Spirit of Chloric Ether.*—1 in 20. A sweetening agent. **B.P. Dose.**—5 to 20 ms. for repeated use; 30 to 40 ms. for a single dose.
4. **Tinctura Chlorformi et Morphinæ Composita.**—A substitute for **Chlorodyne.** Antispasmodic, narcotic. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **A. C. E. Mixture.**—Alcohol 90 p.c. 1, Chloroform 2, Ether 3. Mix. A safer and yet an effective general anæsthetic in protracted operations. Should be dropped on an open mask.
2. **Chloroformum Camphoratum. B.P.C.**—Camphor 2. Chloroform 1, dissolve. A useful local anodyne.
3. **Tr. Chlorof. Comp. B.P.C.**—Chloroform 2, Alcohol 90 p.c. 8, Tr. Card. Co. 10. Mix. *Dose.*—5 to 60 ms.
4. **Camphorodyne.**—A substitute for **Chlorodyne.**—Pulv. Camph. 1 oz., Chloroform 2 ozs., Ol. Menth. Pip. ½ oz., Tr. Cannab. Ind. 2 ozs., Tr. Capsici 1½ ozs,, mix and set aside. Morph. Hyd. 32 grs, Acid Hydrochloric dil. ½ oz., Distilled Water to 1 oz.; mix by the aid of heat and set aside. Acid. Hydrocyanic. Dil. 1 oz. Mucil. Acacia B.P. 1½ ozs., Treacle 5 ozs., Syrup B.P. *q.s.*; mix and add the two previous mixtures (lastly the camphor). Shake and add syrup to 16 ozs. *Dose.*—15 to 30 ms.

PHARMACOLOGY.

Externally.—Like alcohol or ether, chloroform when allowed to evaporate constricts the local blood-vessels and depresses the peripheral sensory nerves, and is therefore a powerful **local refrigerent** and **anæsthetic.** If its evaporation be confined or rubbed into the skin, it causes **rubefaction,** and if the process be prolonged it may lead to **vesication.**

Internally. **Mouth.**—In a concentrated form it is a local **irritant** producing a hot burning sensation. Well diluted it imparts a **warm sweetish taste.** It is a local **anæsthetic** and a **reflex excitant** of the **salivary secretion.**

Stomach and **intestine.**—Chloroform acts like alcohol or ether on the stomach. In medicinal doses it produces (*a*) a sensation of warmth in the epigastrium, (*b*) an increased gastric vascularity, (*c*) an increased flow of the gastric juice, and (*d*) an increased but regular peristaltic movements of the stomach and intestine. Hence it is a **stomachic tonic** and **carminative.** In the intestine it has a slight **sedative** and **astringent** effect, especially when given in the shape of chlorodyne. In large doses it is a **gastro-intestinal irritant**, causing vomiting and purging, followed by stupor, coma and abolition of reflex sensibility.

Heart and **Circulation.**—It readily enters the blood from the respiratory tract, stomach, abraded surface, and when subcutaneously injected. We do not know what changes occur in the blood probably a portion of it is decomposed. In medicinal doses, given by the mouth, it certainly **strengthens** the **cardiac contractions**, but its effect though more rapid than that of alcohol passes off more speedily. If continued long it causes enfeeblement of the heart, but no change in the rate of its beats, except in the last stage when the heart becomes dilated and its rhythm irregular. The **blood vessels** and **capillaries dilate** after complete anæsthesia from the **paralysis** of the **vaso-motor centre.**

Respiration.—During the administration of chloroform, respiration becomes first somewhat slow, then quick, and afterwards slow but steady, unless the chloroform is pushed too far, when it is rendered slower and irregular and at last is stopped

Nervous system.—Chloroform acts on the **nervous system** in somewhat the same manner as alcohol, but its action is more rapid and appears to derange the mental faculties from the beginning. It follows the two laws already described in page 158. For convenience of description, its action on the nervous system may be divided into **four stages.**—

First stage or **Imperfect Consciousness.**—This begins with a feeling of warmth on the surface, sounds in the head, flashes of light before the eyes, choking or suffocation or sometimes cough, especially if the inhalation is concentrated, and comfortable ideas though of a confused nature. Sounds are faintly heard, questions are imperfectly answered, and pain, if present, is not much felt, indicating the blunting of the general sensibility.

Second Stage or **General Stimulation.**—The patient is no longer conscious of external impressions, but according to the temperament, he may sing, cry, shout, or struggle (hence some authors call this "a struggling stage."). At times the struggling is so hard that the patient withholds his breath, his face becomes livid, his eyes protrude and his jugular veins distend. Almost coincidently the **lower centres** are **stimulated** ; the pulse becomes frequent, the heart and large vessels throb, respiration becomes quickened, the blood-pressure rises and the pupils slightly dilate

Third Stage or **Anæsthesia** is characterised by the *complete depression of the nerve-centres which have previously been excited, and the abolition of the reflex action and sensation.* If the inhalation is continued, the patient becomes completely unconscious ; his limbs quite flaccid, and if any of them is held up it falls like that of a corpse ; the touching of his conjunctiva does not cause winking ; only a sluggish contraction of the iris follows when the eyes are suddenly exposed to light ; the **pupils** are **contracted** ; and no wincing is noticed when the skin of a sensitive part is strongly pinched. The pulse falls in volume and frequency, respiration becomes slow and steady, sometimes stertorous, and the blood-pressure falls from the depression of the vaso-motor centre. This is the **fittest stage** for a surgeon to **operate.** 1 to 4 drs. of chloroform is generally necessary to bring on a **complete anæsthesia**.

Fourth Stage or **Paralysis.**—If chloroform is further administered, the **lowest reflex centres** are **paralysed,** causing a **complete loss of muscular tone**, so that the patient involuntarily passes urine and stools, and all the muscles become completely flaccid. Sometimes the surgeon is obliged to push on the inhalation to this extent, in order to enable him to reduce dislocations or to examine abdominal visceræ through the abdominal wall. If the inhalation is still continued, the **pupils dilate**, which is an indication of the commencement of asphyxia, and the paralysis of the **vaso-motor, respiratory** and **cardiac centres**. The **blood-vessels** and **capillaries dilate** and the **blood-pressure falls** to zero. Respiration becomes shallower, weaker and irregular and often stops before the arrest of the heart The pulse grows feeble and intermittent and the heart stops in diastole.

Causes of death under chloroform.—There has been much controversy as to whether death takes place from the heart or from the lungs. The two commissions appointed by the Nizam of Hyderabad came to the conclusion that respiration fails before the heart. But it was strongly disputed. According to Hare the cause of death is the extreme fall of blood-pressure, whereby the dilated arterioles carry the vital fluid into the dilated regions of the capillaries, and the heart stops because there is no blood in the heart to propel. Be that as it may, death may occur from (1) *the arrest of respiration from apnœa* due *either* to the paralysis of the *respiratory centre* or to mechanical causes ; (2) from *the direct paralysis of the heart from shock*, which may happen in any stage without warning ; or from (3) a *sudden failure of both the heart and respiration* at any stage.

Summary of actions.—Chloroform affects the nervous system in the following order :—first, the cerebrum including the mental faculties ; secondly, the sensory part of the cord ; thirdly, the motor tract of the cord ; fourthly, the sensory paths of the medulla, including the reflex excitability ; fifthly, the centres in the medulla particularly the respiratory and the vaso-motor ; and lastly the cardiac muscle. This order sometimes does not hold, the heart may be paralysed before the respiration.

Recovery from chloroform anæsthesia takes place in the reverse order. The lowest functions (*e.g.*, the muscular tone) reappear first, then after a while the consciousness, and lastly the mental equilibrium.

Involuntary muscles and **peripheral nerves.**—The involuntary muscles are not obviously affected, for the parturient uterus contracts under chloroform narcosis. The peripheral nerves are affected only a little before death.

Elimination.—Only a portion of chloroform is excreted in the breath and urine. In poisoning it may be found in the blood.

THERAPEUTICS.

Externally.—As a *local anodyne* chloroform is far inferior to other agents, though it may be combined with them with advantage, as it promotes absorption through the skin of many substances, *e.g.*, the alkaloids. Hence the chloroformic liniments of aconite and belladonna, or a mixture of the liniments of aconite, belladonna and chloroform (see p. 202) may be applied in **myalgia**, **lumbago**, **chronic rheumatism**, **pleurodynia** and **pleurisy**. If rubefaction or counter-irritation is desired, the liniment of chloroform may be sprinkled over a piece of folded cloth or lint and covered with oiled silk. Two or three drops of chloroform on a pellet of cotton wool introduced into the ear, relieve **toothache** or **faceache**. The pain of **cancer** and **pruritus pudendi** may be temporarily relieved by playing its vapor on their surfaces. In the form of an ointment ($\frac{1}{2}$ dr. to 1 oz. of lard) it may be used to allay the itching of **prurigo**, **lichen** and **urticaria**. A deep hypodermic injection (10 ms.) near the sciatic nerve relieves **sciatica**.

Internally. **Gastro-intestinal tract.**—A bit of cotton wool soaked with chloroform and introduced into the cavity of a painful carious tooth relieves **toothache**. It is an excellent medicine for disguising the unpleasant taste (see p. 117) of many drugs. One to three drops of chloroform may check **vomiting**, **sea-sickness** and **flatulent distension**. In **diarrhœa** or in the beginning of **cholera**, spirit of chloroform may be usefully given with opium or other astringents. Chlorodyne and camphorodyne are also very efficient remedies in these cases. Chloroform is very serviceable in **intestinal** and other **colics** because of its *antispasmodic effect*. It is usual to give it in those cases with opium or morphine.

Heart.—As a *diffusible cardiac stimulant* it is generally given in the depressed condition of the system or spirits, nervous exhaustion, &c

Respiratory tract.—Combined with opium or morphine it allays many **coughs**, especially if they are paroxysmal or violent.

Inhalation.—Besides its internal uses, chloroform may be given as an inhalation in the following class of cases :—

1. *To deaden the sensation of pain* of **surgical operations.**
2. *To relax muscular spasm* in the reduction of **dislocations**, **hernias**, **fractures**, or during **catheterism**.

3. *For the purpose of diagnosis*, as in the case of young children or hysterical subjects. For the examination of abdominal visceræ or to ascertain whether a particular swelling is a real or a phantom tumour.

4. *To relieve intense pain of certain diseases*, such as **biliary, intestinal** and **renal colics, neuralgias**, &c.

5. *To relieve spasms* of many convulsive diseases, such as **tetanus, strychnine-poisoning, hydrophobia, puerperal eclampsia, chorea, uræmia**, &c. The distressing dyspnœa of **asthma** and of **aneurism**, and the violence of the paroxysms of **whooping cough** and **hiccough** may be lessened by the inhalation of a few drops poured on a handkerchief or on the palm of the attendant.

6. *To relieve suffering or to relax the rigidity of the os or other soft parts during parturition*, a moderate inhalation may be given with benefit during the pains.

Administration of chloroform.—There are **two methods** of administering chloroform almost without danger. The first is to give it in small quantities well diluted, gently and cautiously increasing the strength; and the second is to administer it in large doses more or less concentrated. Each of these plans has its advantages. The former takes a longer time to anæsthetise and causes no shock, while the latter takes a shorter time; and if there is any shock at all, it is induced at a time when the system can best bear it. Those who combine the two methods come to grief.

The following practical hints should be particularly attended to while administering chloroform:—

1. Chloroform should be perfectly **pure**. The A.C. (alcohol and chloroform) mixture or A. C. E. mixture is only indicated in cases where there is a fatty or weak heart, or where the operation is likely to be a protracted one (see p. 332).

2. No **solid food** should be given at least six hours before the administration. Morning is the best time for chloroforming, as the patient then is in a refreshed condition and may easily be kept without food.

3. All **tight clothes** from the neck, chest and abdomen should be removed or materially loosened. Attendants' or dressers' hands should not remain over the chest or abdomen while holding the patient.

4. Artificial teeth should be taken out of the mouth.

5. The safest position of the patient is the dorsal decubitus (see p. 333).

6. As the **undivided attention** of the chloroformist is essential for the safety of the patient, the operator should not undertake to administer the chloroform and to operate at the same time.

7. Chloroform should be freely diluted, say with 95 p. c. of air.

8. An ordinary handkerchief or a piece of lint folded in the form of an open cone within which some absorbent cotton has been stitched is the best inhaler in the absence of the Junker's apparatus. If a cone is used it should not be held either too close to, or too distant from, the mouth and the nose. The proper distance throughout the inhalation is the nearest which does not cause choking, struggling or holding of breath.

9. If the patient is weak a small dose of brandy or whisky may with benefit be given before inhalation.

10. The smallest quantity—say about 20 to 30 ms.—should be poured each time. Some prefer to give a larger dose in the beginning so as to lessen the period of excitement.

11. Pay particular **attention** to **respiration**, as most of the accidents are caused by its failure. Irregularity of breathing is generally caused by the insufficiency of air, which makes the patient struggle or hold his breath.

12. No operation should be commenced until the patient is under **complete anæsthesia**, *i.e.*, in the third stage. The loss of corneal reflex is the chief indication of it. Stertorous breathing or a complete relaxation of muscles is rather a dangerous test.

13. Directly the **corneal sensibility** is **lost** or **respiration** becomes **stertorous**, the **inhalation** must be **suspended**. In case the stertor comes on while the cornea is still sensitive, the inhalation should not be proceeded with, as it invariably happens that the cornea becomes insensitive within a few seconds afterwards.

14. The patient's head should invariably be thrown to the side, his lower jaw pushed down and his tongue drawn forward if necessary during vomiting, so that no vomited matter may enter the larynx. If by chance any get into it and asphyxia threatens, laryngotomy should at once be performed.

15. The **pallor** of the **face** is best controlled by lowering the head and giving amyl nitrite inhalation.

16. Special care should be taken during an operation in the mouth to prevent any blood flowing down into the larynx. Full anæsthesia may be maintained by introducing chloroform vapor into the post nasal space through a soft catheter connected with the Junker's inhaler ; or by injecting morphine subcutaneously before the inhalation.

17. The **lividity** of the **face** and **deep stertor** should at once be controlled by raising the shoulders, opening out the mouth and pulling out the tongue. If breathing threatens to stop or stops altogether, artificial respiration according to Silvester's plan should immediately be commenced, and at the same time fingers may be thrust under the ribs to mechanically stimulate the heart. Artificial respiration should be maintained for at least an hour or so, and if there be any sign of returning life, it should be continued for several hours. Besides strychnine, ether or brandy should be injected hypodermically and amyl nitrite inhaled. The bandaging of limbs and compression on the abdominal contents help to bring back the blood to the empty heart and to the anæmic brain. The head may be held downwards for the same purpose.

Treatment after inhalation.—No food should be given for at least two hours after inhalation. Iced soups or jellies and iced milk with soda-water may be given during the next 12 hours. Vomiting may be checked by lumps of ice or by a tea-spoonful of burnt brandy.

Dangers during administration.—Broadly speaking they may arise from two sources ; *viz.*—(1) the failure of respiration, and (2) the failure of the heart, as detailed below :—

1. **Death from suffocation** may be caused by—

(*a*) *Obstruction of the glottis* by the tongue, vomited matter or blood.

(*b*) *Spasm of the glottis* from the inhalation of chloroform vapor which either is too strong, or contains irritating products of decomposition. The vapor may be decomposed by *artificial light in a confined space.*

(*c*) *Mechanical impediments to free respiratory movements* may be caused by pressure on the chest (1) by the **lateral position**, as in obstetric and renal operations; (2) by the **face-position**, as in operations on the back; (3) by **tight clothes, bandages**, or **assistants' arms**, &c.; (4) by the **lips** and **alæ nasi** of old persons who have lost their teeth, which are drawn in with each inspiration and thus act as valves to the passages; and (5) by the spasmodically **withholding of breath** by the patient in the early stages, which can soon be overcome by the further inhalation of chloroform.

(*d*) *Paralysis of the respiratory centre* caused either by the administration of too concentrated vapor, or of chloroform vapor along with carbonic acid, as it may occur if the cone is kept closely covering the mouth and nose without allowing the ingress of air.

2. **Death from the stoppage of the heart** may occur from—

(*a*) The *excessively concentrated chloroform vapor* causing suddenly paralysis of the cardiac muscle.

(*b*) *The shock of operation* reflexly stopping the heart. This may happen even in trivial operations from imperfect anæsthesia.

(*c*) *Diseases of the heart.* The heart is apt to fail if it is fatty, dilated, or structurally disorganised. Therefore it is risky to administer chloroform to the old, the infirm, the anæmic, drunkards, epileptics and those who suffer from valvular diseases. For them ether is the safest anæsthetic. A. C. E. mixture or the simultaneous inhalation of oxygen and chloroform vapor may also be resorted to in carefully selected cases. (See p. 207.)

Self-administration of chloroform must as a rule be condemned, but occasions may arise when a physician has to recommend it, as in the case of biliary or urinary colics when he cannot stay long with the patient, or cannot procure a suitable assistant to entrust with the inhalation. He may in that case direct the patient to inhale slowly through one of Junker's apparatus after hooking it to the head of his bed, or from a tumbler in which a few drops of chloroform have been poured on a folded piece of blotting paper put within it. But the bottle of chloroform should never be entrusted to him.

CHRYSAROBINUM. See p. 246.

CIMICIFUGÆ RHIZOMA. Cimicifuga.

N.O. *Ranunculaceæ.*

Syn. B.P.—Actææ Racemosæ Radix. Black snake-root.

Habitat.—United States, Canada.

Source.—The dried rhizome and roots of *Cimicifuga racemosa.*

Characters.—*Rhizome* 2 to 6 in. long, ½ to 1 in. thick, hard, cylindrical, with remains of stout ascending branches marked with encircling leaf-scars. *Roots* brittle. Odor faint. Taste bitter, acrid.

Composition.—(1) A *Volatile Oil.* (2) *Two Resins.* (3) *Gallic and Tannic Acids. Cimicifugin* is an impure resin precipitated from the tincture.

Dispensing hints.—It deteriorates by keeping.

Action.—Stomachic tonic, cardiac tonic and antirheumatic.

OFFICIAL PREPARATIONS.

1. **Extractum Cimicifugæ Liquidum.**—1 in 1. **B.P. Dose.**—5 to 30 ms.
2. **Tinctura Cimicifugæ.**—1 in 10. **B.P. Dose.**—$\frac{1}{2}$ to 1 dr.

PHARMACOLOGY.

Internally.—It has a peculiar action. In small doses, it is a **stomachic tonic** like vegetable bitters, and a **cardiac tonic** like digitalis. In large doses, it causes vomiting, **depresses** the **heart** like aconite, **paralyses** the **sensory side** of the **cord** thereby lowering the reflex excitability, and **increases** the **bronchial secretion.** It affects the **uterus** like ergot and produces the normal instead of the tonic contractions.

THERAPEUTICS.

Internally.—It is not so frequently used. As a *stomachic tonic* it may be given in **dyspepsia** accompanied with neuralgic pain. I is very much praised in **chronic rheumatism, lumbago, pleurodynia,** and **chorea** especially when there is in addition a rheumatic tendency. It is recommended in **irritable** and **fatty heart, dysmenorrhœa, amenorrhœa, headache, sciatica** and **chronic bronchitis.** It is a very useful remedy for chronic or subacute **uterine tenderness.** It should be given with great caution to pregnants.

CINCHONÆ RUBRÆ CORTEX. Red Cinchona Bark.

N.O. *Rubiaceæ.*

Habitat.—South America. Cultivated on the Nilgiris and in Sikkim, Burma, Central India, Ceylon, Java, &c.

Source.—The dried bark of the stem and branches of cultivated plants of *Cinchona Succirubra.*

Besides the official, there are several varieties of bark from which quinine is extracted. About thirteen kinds of cinchona are grown in the Government plantations in India.

Characters.—In quilled or incurved pieces, coated with periderm; 2 in. to 1 ft. long, $\frac{1}{10}$ to $\frac{1}{4}$ in. thick; outer surface reddish-brown, rough from longitudinal ridges, transversely cracked and warty; inner surface brick-red, coarsely striated. Fracture shortly fibrous. Powder brownish or reddish brown. No odor. Taste bitter, somewhat astringent. *Impurities.*—Barks inferior in strength.

Tests.—It should yield 5 to 6 p. c. of total alkaloids, of which half should consist of quinine and cinchonidine. The process for their estimation is given in the B. P. (which see.)

Composition.—The bark contains the following.—

A. *Four important alkaloids.*—(1) *Quinine,* as a hydrate. (2) *Cinchonine.* (3) *Quinidine.* (4) *Cinchonidine,*

B. *Three acids.*—(1) *Chinic* or *Quinic Acid* closely allied to benzoic acid. (2) *Chinovic Acid.* (3) *Cincho-tannic Acid.*

C. *One glucoside.—Chinovin,* which easily splits up into chinovic acid and glucose,

D. *One coloring ingredient.—Cinchona Red,* almost insoluble in water.

E. *One Volatile Oil,* which gives the bark its smell.

Incompatibles.—Ammonia, lime water, metallic salts, and gelatin. In practice it is combined with acids, alkalis, iron and digitalis.

Action.—Bitter tonic, astringent, antiperiodic.

OFFICIAL PREPARATIONS.

1. **Extractum Cinchonæ Liquidum.**—5 grs. of alkaloids in 110 ms. standardised. A brownish liquid. **B.P. Dose.**—5 to 15 ms.
2. **Infusum Cinchonæ Acidum.**—1 in 20 (1 hour). **B.P. Dose.**—½ to 1 oz.
3. **Tinctura Cinchonæ.**—1 gr. of alkaloids in 110 ms. Reddish-brown. **B.P. Dose.**—½ to 1 dr.
4. **Tinctura Cinchonæ Composita.**—½ gr. of alkaloids in 110 ms. Red. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Decoctum Cinchonæ. B.P. 1885.**—Bark 1¼, Distilled Water *q.s.* to 20. Boil for 10 minutes. *Dose.*—1 to 2 ozs.
2. **Cinchona Febrifuge.**—Prepared and sold by the Government of India. It has an average percentage of crystallisable quinine 15·5, cinchonine 33·5, cinchonidine 29, amorphous alkaloid 17, coloring matter 5. Though a valuable antiperiodic and febrifuge, it causes nausea, vomiting and derangement of bowels.
3. **Cinchonidinæ Sulphas.**—In colorless silky crystals soluble in water. *Dose.*—1 to 10 grs.
4. **Cinchoninæ Sulphas.**—In colorless prismatic crystals soluble in water. *Dose.*—1 to 10 grs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Cinchona bark is an **astringent bitter tonic, a febrifuge** and a **mild antiperiodic,** due to the alkaloids and other ingredients it contains. The crude bark irritates the stomach and bowels. It is often prescribed with other vegetable bitters during convalescence from an acute febrile attack, or along with quinine salts to promote their antiperiodic property. On account of its astringent and antiperiodic virtues, it is often used with benefit in **diarrhœa** and **dysentery** accompanied with malarial fever. The writer has seen it acting as an **anhydrotic** in **excessive sweating** of **malarial remittents** and **ague.**

QUININÆ HYDROCHLORIDUM. Quinine Hydrochloride.

$C_{20}H_{24}N_2O_2, HCl, 2H_2O$.

Syn. B.P.—Hydrochlorate of Quinine, B.P. 1885.

Source.—Obtained from the bark of various species of cinchona and Remijia.

Characters.—In crystals like those of quinine sulphate, but somewhat larger. *Solubility.*—1 in 35 of cold and freely in boiling water, 1 in 3 of alcohol 90 p.c.

Action.—Antiperiodic, antipyretic, tonic. **B.P. Dose.**—1 to 10 grs.

Official Preparations.

1. **Tinctura Quininæ.**—2 grs. in 110 ms. **B.P. Dose.**—½ to 1 dr.
2. **Vinum Quininæ.**—1 gr. in 1 oz. **B.P. Dose.**—½ to 1 oz.

QUININÆ HYDROCHLORIDUM ACIDUM.

$C_{20}H_{24}N_2O_2, 2HCl, 3H_2O$.

Source.—The same as that of hydrochloride of quinine.

Characters.—A white crystalline powder. *Solubility.*—In less than its own weight of water. Reaction acid. **B.P. Dose.**—1 to 10 grs.

QUININÆ SULPHAS. Quinine Sulphate.

$\{(C_{20}H_{24}N_2O_2)_2, H_2SO_4\}_2, 15H_2O$.

Source.—The same as that of quinine hydrochloride.

Characters.—Filiform, silky white crystals; taste intensely bitter. *Solubility.*—1 in 800 of water, giving the solution a bluish fluorescence; entirely in water acidulated with a mineral acid. *Impurities.*—Cinchonine, quinidine, cupreine or amorphous alkaloid, lime, chalk, magnesia, starch. It should not yield more than a total of 3 p.c. of cinchonidine.

Cinchonine, quinine and cupreine are not present in the quinine sulphate of any known commercial manufacturer. Cupreine is only present if *cuprea* or *Remijia* bark is used, but it is seldom used now.

Tests.—Aqueous solutions of quinine salts yield with solution of ammonia white precipitates, soluble in ether and in excess of the solution of ammonia. When such aqueous solutions are treated first with solution of bromine or of chlorine and afterwards with solution of ammonia, they become of an emerald-green color, changing to red when mineral acids are added. Exposed to dry air, quinine sulphate effloresces, until the 15 molecules of water have been reduced to 4. It affords the reactions characteristic of sulphates. 2·5 grammes of freshly prepared salt should lose ·38 gramme of water by drying at 212° F. Heated to redness with free access of air, it burns without leaving any residue (absence of mineral impurity).

For tests for *cinchonidine*, *cinchonine*, *quinidine*, *cupreine* and *amorphous alkaloids* see the B.P., 1898, p p. 227—8.

Incompatibles.—Alkalis and their carbonates, astringent infusions.

Enters into.—The preparation of Ferri et Quin. Citras, Syr. Ferri Phosph. c. Quin. et Strych., and the

OFFICIAL PREPARATIONS.

1. **Pilula Quininæ Sulphatis.**—5 in 6. **B.P. Dose.**—2 to 8 grs.
2. **Tinctura Quininæ Ammoniata.**—2 grs. in 110 ms. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES OF QUININE.

1. **Quininæ Albuminas.**—54 p.c. of quinine. Amorphous.
2. **Quin. Arsenas.**—*Dose.*—$\frac{1}{10}$ to ¼ gr. in malaria.
3. **Quin. Carbolas.**—A crystalline salt containing 77 p.c. of anhydrous quinine. In diarrhœa. *Dose.*—2 grs.
4. **Quin. Chloras.**—In white needles slightly soluble in water. *Dose.*—1 to 5 grs.
5. **Quin. Citras.**—Like sulphate. *Dose.*—1 to 5 grs.
6. **Quin. Ethylcarbonas.** *Syn.*—*Euquinine, Euchinine.*—In crystals sparingly soluble in water. An excellent substitute for quinine sulphate. May be given to children in milk or soup as it is not so bitter. *Dose.*—5 to 10 grs.
7. **Quin. Fluoridum.**—Reduces enlarged spleen and fever. *Dose.*—2 to 5 grs.
8. **Quin. Glycerophosphas.**—2 kinds, *viz.*, basic and neutral. In obstinate neuralgia or chronic malaria. *Dose.*—3 to 8 grs.
9. **Quin. Hydrobromidum.**—In white acicular crystals soluble in water. Used as an antipyretic and antiperiodic. With excess of diluted hydro-bromic acid lessens cinchonism. *Dose.*—1 to 5 grs. or more.
10. **Quin. Hydrobrom. Acidum.**—Yellowish crystals, very soluble in water. Used hypodermically. *Dose.*—½ to 2 grs.
11. **Quin. Hydrochloro-Carbamidum.** *Syn.*—*Urea Quinine.*—Soluble in water. Used hypodermically in cholera in 12 to 15 gr. doses.
12. **Quin. Hydrochloro-Sulphas.**—Soluble 1 in 2 of water. Used for hypodermic purposes. *Dose.*—1 to 10 grs.
13. **Quin. Hypophosphis, Quin. Phosphas.**—*Dose.*—1 to 6 grs.
14. **Quin. Iodas, Quin. Hydriodum, Quin. Hydriod. Acidum.**—In chronic rheumatism and tubercle. *Dose.*—2 to 5 grs.
15. **Quin. Lactas.**—A granular white amorphous powder soluble in water. Suitable for internal and hypodermic use. *Dose.*—1 to 5 grs.
16. **Quin. Oleatum.**—1 in 3 of Oleic Acid. Readily absorbed when applied externally.
17. **Quin. Salicylas.**—Silky, acicular crystals sparingly soluble in water. In remittent fever, rheumatism, neuralgia and diarrhœa. *Dose.*—2 to 6 grs.
18. **Quin. Sulphas Acida.** *Syn.*—*Neutral Quinine Sulphate.*—Soluble 1 in 12 of water. For hypodermic injection. *Dose.*—1 to 10 grs.
19. **Quin Sulphocarbolas.**—An amorphous white powder. *Dose.*—1 to 6 grs.
20. **Quin. Tannas.**—An amorphous, whitish-yellow powder. Not so bitter, suitable for children. In fever with diarrhœa. *Dose.*—1 to 4 grs.
21. **Quin. Tartaras.**—Sparingly soluble. Used hypodermically.
22. **Quin. Valerianas.**—In nervous headache and hysteria. *Dose.*—1 to 4 grs.
23. **Quinetum.**—The mixed alkaloids from the East India red cinchona bark. The sulphate is like quinine sulphate. *Dose.*—1 to 10 grs.

24. **Quinoidin.** *Syn.—Chinoidin.*—A mixture of alkaloids mostly amorphous obtained as a by-product. *Dose.*—1 to 5 grs.

25. **Quinolin.**—Obtained by distilling quinine or cinchonine with aqueous potassium hydroxide, or synthetically. Antiseptic.

26. **Quinosol.** *Syn.—Potassium Oxychinolin Sulphate.*—Antiseptic, disinfectant and deodorant. Acts better in solution than in powder.

27. **Warburg's Tincture.** *Syn.—Tinctura Antiperiodica. B.P.C.*—Take off in grains, Aloes Soc. 240, Rhubarb 80, Angelica Fruit (of *Archangelica Officinalis*) 80, Elecampane Root (rhizome and root of *Inula Helenium*, Linn.) 40, Saffron 40, Fennel 40, Prepared Chalk 40, Gentian 20, Zedoary Root (root of *Curcuma Zodoaria*) 20, Cubebs 20, Myrrh 20, White Agaric (the white fungus *Polyporus officinalis*, Fries) 20, Opium 2½, Black Pepper 4, Cinnamon 8, Ginger 8; Alcohol 60 p. c., *q. s.* Macerate for seven days in one pint of alcohol, press, filter, and dissolve in the product Quin. Sulphate 175 grs., Camphor 20 grs. After three days filter and add alcohol *q.s.* to 1 pint. *Dose.*—1 to 4 drs.

PHARMACOLOGY.

Externally.—Quinine sulphate, ordinarily called quinine, is an active poison to many low vegetable and animal organisms. Even a weak solution of quinine (1 gr. to 1 oz. of water) kills many active infusoria, bacteria and protozoa. According to Binz a solution (1 in 20,000, *i. e.*, 1 gr. in 46 ozs. of water) destroys paramecia in hay infusions in two hours. In small doses it diminishes and in large doses arrests **fermentation** due to organised ferments, but it has no action on the conversion of sugar by ptyalin or diastase. Hence it is a powerful **antiseptic** and **disinfectant.** It does not affect the healthy skin, but irritates an abraded surface.

Internally. **Mouth.**—It is a pure vegetable **bitter**, and has an intensely persistent bitter taste if taken in neutral or slightly acid solution, as the alkaline saliva precipitates the alkaloid. Like other bitters it **reflexly stimulates the salivary secretion** by exciting the gustatory nerves; but, if it is injected into the duct of the submaxillary gland, it checks its secretion either by paralysing the ends of chorda tympani or the secreting cells. The sympathetic fibres are not affected except in very large doses, consequently the secretion of the thick ropy saliva is not prevented.

Stomach and **intestine.**—All quinine salts are, in the stomach, converted into a hydrochloride, which, being soluble, is easily absorbed. In small doses (1 to 2 grs.) it is a bitter **stomachic tonic** like calumba (see p. 298), and indirectly acts as a general and cardiac tonic. In large doses (15 to 40 grs.) it produces opposite effects—depression and gastro-intestinal irritation. It is not easily absorbed from the intestine as it is precipitated by the alkaline juice.

Blood.—After absorption into the blood, quinine performs certain specific acts which may best be described under the following heads :—

1 *White corpuscles.*—Quinine paralyses the movements of

the white blood-corpuscles. This may be seen by putting a drop of its solution on a drop of fresh blood under a microscope. It also arrests their migration through the capillaries (diapedesis), if quinine is injected into the blood-vessel, but cannot prevent the movement of those that have already migrated outside of the vessel. But if it is injected into the tissues around the blood-vessel but not into it, the movement of corpuscles outside of it is arrested, and the motionless corpuscles are seen to gather round the outside of it. This action of quinine was at one time supposed to be very important, as it tended to lessen the formation of pus. According to Binz it diminishes the number of white corpuscles.

2 *Red corpuscles.*—These are not materially affected, though many assert that it increases their number and causes their enlargement. In large doses it produces opposite effects.

3. *Hæmoglobin.*—The oxyhæmoglobin is made a stable compound, consequently the blood cannot either absorb or give up oxygen so readily as in health. Probably this does not occur in medicinal doses.

4. *The oxidising power* of the blood is considerably affected as will be evident from the following experiment. If the tincture of guaiacum is added to the ozonic ether (a solution of hydrogen peroxide in ether), no blue color appears, because guaiacum resin has not sufficient affinity for oxygen, but the addition of a drop of blood to this mixture gives a blue color at once, indicating that blood has the power of taking up oxygen from the ozonic ether and of transferring it to guaiacum. Quinine added to the blood checks this **oxidising influence**.

5. *Acidity of blood.*—Ordinarily fresh drawn blood turns acid after a while, but quinine checks this when added to it.

6. *Micro-organisms.*—Under the administration of quinine, malarial germs *(plasmodium malariæ)* disappear from the peripheral circulation, but its action on *crescent forms* and *flagellated bodies* appears to be less certain. The utility of quinine in arresting malarial fever is therefore due to its acting as a poison to the plasmodium and not to its action on leucocytes.

Heart and Circulation.—Small doses **reflexly stimulate** the heart through the stomach, but large doses **directly paralyse** it; the pulse becomes slow and feeble, and at last the heart **stops in diastole**. It is not definitely known whether this action is due to its influence on the muscular fibres or on the motor ganglia of the heart. The blood-pressure is increased by small doses, and is very much lowered by large doses owing to its depressing influence on the heart and on the vaso-motor centre.

Respiration.—It is not affected by small doses, but is quickened by moderate doses, and in toxic doses it is first slowed then arrested. It diminishes gaseous interchange.

Liver and Spleen.—It has no action on the liver, but **contracts** the recently **enlarged spleen**. The writer has often observed this, even when the fever is not checked by the drug. On chronic hypertrophy of the spleen it has no effect.

Temperature—Quinine very slightly or not at all lowers the temperature in health, but causes a marked reduction in fevers, particularly if they are of malarial origin. It is therefore an **antipyretic** on account of (1) diminished oxidation, (2) lessened tissue metamorphosis, and (3) its specific action on the malarial or specific germs.

Nervous system.—Small doses tone up the nervous system, and large doses produce a train of symptoms which is termed **cinchonism** (*q. v.*).

Cerebrum.—Small doses stimulate and large doses depress the functions of the brain. Sometimes the motor centres are excited causing epileptic fits.

Cord and *nerves.*—Quinine does not affect the functions of the cord and nerves in man, though it reduces the reflex activity in frogs.

Uterus.—Only on a very limited number of pregnants, quinine acts as an **ecbolic**, but it certainly intensifies the labour-pains or re-establishes them if they are absent, when parturition has already commenced. The writer has seen a female, who took about an ounce of quinine within one week, procure abortion (six months' pregnancy) without any effect. Though she suffered dreadfully from cinchonism yet there was no sign of uterine contraction.

Metabolism.—In large doses quinine affects the oxidation of the protoplasm on account of its action on the oxyhæmoglobin (see p. 339).

Urinary tract.—Quinine is excreted by the kidneys very slowly, continuing for several days, though rapidly during the first forty-eight hours. The amount of nitrogenous products, such as urea, uric acid, &c., is diminished. In many cases it irritates the bladder and the urethra.

Skin.—It escapes, though slightly, through the skin and does not seem to increase the perspiration, except in malarial pyrexia. It produces papular, erythematous and scarlatiniform rashes (see p. 150–1).

Elimination.—It is thrown out with the urine, sweat, milk, saliva, bile, tears, dropsical fluid and fæces.

Toleration.—Some persons are very susceptible to the action of this drug. Even a small dose may produce cinchonism particularly headache and ringing in the ears The writer has seen a female who became collapsed after taking 5 grs. of quinine sulphate. (See p. 106)

Cinchonisim.—A single large dose (20 grs.) or small doses frequently repeated cause ringing in the ears, frontal headache, slight deafness and dimness of vision. In larger doses these symptoms are intensified, with the addition of staggering gait, muscular and cardiac weakness.

Acute toxic action.—It is rarely taken as a poison. If it is, the above symptoms are further intensified. The patient becomes deaf, blind, delirious and collapsed, and dies either from cardiac or respiratory failure, or from convulsions.

THERAPEUTICS.

Externally.—Quinine cannot be freely used on account of its cost, though it is a *powerful antiseptic.* Its lotion (2 to 4 grs. in 1 oz. of water) has been found very efficacious **in diphtheritic conjunctivitis**), and as an injection in **hay fever, otorrhœa,** and **chronic cystitis.** Its diluted solution preserves meat, milk, butter, urine, &c.

Internally.—As an *antiseptic* its lotion may be used as a gargle in **stomatitis. diphtheritic ulceration** and **sorethroat.**

As a *stomachic tonic* it is very useful in convalescence from an acute illness, particularly the malarial fever. Its efficacy is considerably increased if it is combined with mineral acids and other bitters.

As an *antipyretic* it is far inferior to phenazone, phenacetin, acetanilide or sodium salicylate, but there are many who advocate its use in 10 to 20 gr doses in **typhus, typhoid** and **puerperal fevers, acute rheumatism, insolation** and **pyæmia.** It must be given just before the natural defervescence. It is useless in hyperpyrexia.

As an *antiperiodic* and *febrifuge* it is considered almost a specific for **ague, malarial fever,** and all **malarial intermittent** and **remittent affections.** A few of them require more than a passing notice—

(1) *Ague.*—Being a direct poison to the malarial parasite, quinine acts as a specific for ague. A single large dose of 15 to 20 grs. before the expected paroxysm, or a small dose of 3 to 5 grs. repeated four or five times during the intermission, will check an attack of moderate intensity. An emetic or a cholagogue purgative, preferably the latter, should be given before the administration of quinine. Repeated small doses are the customary plan of giving it in this country, but the writer considers a single large dose of 10 grs. two hours before a fit, and 3 or 4 small doses during intermission are more efficient in many cases than small doses alone. In many obstinate cases, he gives two large doses, one at the beginning of defervescence and the other two hours before the expected fit. It is useless to administer the powdered drug in excessively large doses as it is not absorbed. In whichever way it is given, it should be continued as a *prophylactic* for some time in 2 to 5 grs. doses three times a day. Some advocate a large dose (15 grs.) every fifth or sixth day for this purpose. It must however be noted that the antiperiodic property of quinine bears no relation to "cinchonism." The patient may become deaf for the time being or in rare instances permanently, and yet the fever may not be arrested.

(2) *Enlargement of the spleen.*—With the cure of ague the size of the spleen is reduced, but the efficacy of quinine is greatly augmented if it is given with iron as in the following prescription:—Quin Sulph. 2 grs., Ferri Sulph. ½ gr., Pulv. Rhei 5 grs., Pulv. Ipecac. ⅙ gr., Pulv. Zingib. 2½ grs. and Sod. Bicarb. 2½ grs. M., T. D. In a recently enlarged spleen with ague or no ague, the writer uses this formula with marked success. Fluoride of quinine may sometimes benefit chronic hypertrophy of the spleen.

(3) *Malarial remittent* and *malarial continued fevers* run almost a definite course, but their intensity and progress may be controlled by the judicious use of quinine. The writer always administers either the salicylate or the hydrobromide in 3 to 5 gr. doses twice or thrice daily during remission in remittents, and without any reference to temperature in continued fevers. But as soon as the intermission is obtained, he gives quinine with bark and stimulants. In these fevers it is a mistake to give quinine in antipyretic doses, for it only depresses the heart without affecting materially the temperature.

(4) *Malignant forms of ague* or *pernicious malarial fever.*—Many deaths occur from this type of fever, either from ignorance or from want of courage on the part of the physician to administer quinine in sufficiently large doses. From the beginning without any reference to temperature or local symptoms, with stimulants if necessary, quinine must be given in 20, 30, or 40 gr. doses either by the mouth or by the rectum. Hypodermic or intravenous injection sometimes succeeds well. **Kalazar** is but a pernicious type of malarial fever.

(5) *Malarial cachexia* or *hæmorrhagic malarial fever* is not at all benefited by quinine.

(6) *Intermittent* or *remittent neuralgias*, such as **brow-ague, faceache** or **headache** of malarial or non-malarial origin, often yield to quinine. Sometimes such minute doses as will adhere to the finger's tip dipped into the powder sucked every few minutes will be found very effective (Ringer).

(7) *Intermittent hæmaturia* and *asthma* may be benefited by quinine, but it must be noted that it is neither a hæmostatic nor a bronchial antispasmodic. It is sometimes given in **tetanus** in this country not with a view to arrest the spasms, but to reduce the temperature or to act as a febrifuge.

As a *prophylactic* against **ague** and other **malarial affections** it has been found very effective, but we cannot define the period during which we should continue it, for relapses have taken place after one, two, or more years, even when the patient has been removed from an infected place and has had no chance of a fresh infection. By quininising its inhabitants we can markedly lessen the malarious fever of a district, but it is not possible to adopt this measure on a large scale.

As an *ecbolic* it is always prescribed in place of ergot during

labor, if there is no obstruction. Ten grains followed by a similar dose after one or two hours often strengthen weak pains.

As a *nervine tonic* it has been used in a host of nervous diseases generally with iron and strychnine, as Easton's Syrup, with great benefit.

Besides the diseases already mentioned, quinine may be given in **acute catarrh, influenza, hay fever, croup, diphtheria, pneumonia, passive hæmorrhage, lumbago, sciatica, septicæmia** and **rigors** after **catheterism.**

Caution.—It should be avoided or given very cautiously in acute or subacute diseases of the middle air, gastro-enteritis, extreme anæmia, active cerebral congestion, skin eruptions, such as erythema, urticaria, &c., and to pregnants and persons particularly susceptible to its influence.

Prescribing hints.—It may be given in cachets, pills or mixtures (see p.p. 82, 83 and 89). The pills must be made afresh (see page 89). Hard or old capsuled pills are often expelled undissolved. Mineral acids (1 m. to each grain, see p. 82) and tincture of ferric chloride dissolve the sulphate, but unless an excess of acid is used, it will leave a peristently bitter after-taste (see p. 338). To avoid this it may as well be given in an effervescing form dissolved in citric acid, or simply suspended in water. To diminish cinchonism the hydrobromide may be given with diluted hydrobromic acid, an excess of which sometimes causes diarrhœa. The after-taste of quinine is soon removed or not perceived at all if the patient swallows a little water after taking the drug, and chews a few bits of betel-nut, myrobalan (*haritaki*), unripe guava, or any other substances containing tannin. Being almost tasteless euquinine is fit for administration to children (see p. 119). The writer has not much confidence in the sulphate as it is often adulterated.

If there is much *gastric irritability*, any of the soluble neutral or acid salts may be given hypodermically, or in their absence the sulphate may be used as an enema or may be given with opium. The intravenous injection may be resorted to only when we want to influence the system within a few hours. The antiperiodic virtue of quinine is greatly enhanced if we combine with it the preparations of cinchona (see p. 112), opium, Indian hemp, arsenic, &c. In spite of all such combinations, quinine sometimes fails to effect a cure. In many obstinate malarious fevers, Warburg's tincture may be employed with great benefit, but it should be used with great caution, as it causes copious perspiration, fall of temperature and weakness and slowing of the heart.

For special requirements we can select special preparations from the list given in pages 337—8.

CINNAMOMI CORTEX. Cinnamon Bark. N.O. *Laurineæ.*

Syn I.V.—*Dálchini*, Beng., and Hind. *Gudatvak*, Sans.

Habitat.—Ceylon. Known as Ceylon cinnamon in commerce.

Source.—The dried inner bark of shoots from the truncated stocks of *Cinnamomum Zeylanicum.* Obtained from cultivated trees.

Characters.—In rolled quills ; thin, brittle, splintery, light yellowish-brown ; $\frac{3}{8}$ in. in diameter. Odor fragrant. Taste warm, sweet, aromatic. *Impurity.*—Cassia bark.

Identification.—It resembles cassia bark, which is coarser, thicker and less aromatic.

Composition.—(1) *Volatile Oil* (*off.*). (2) *Tannin.* (3) *Sugar.* (4) *Gum.*

Action.—Aromatic stimulant, astringent. *Dose.*—10 to 60 grs.

Enters into.—Decoc. Hæmatoxyl., Pulv. Catechu Co., Pulv. Cretæ Arom., Pulv. Kino Co., Tr. Card. Co., Tr. Catechu Co., Tr. Lavand. Co. and the

OFFICIAL PREPARATIONS.

1. **Aqua Cinnamomi.**—1 in 10 **Dose.**—1 to 2 ozs. *Enters into.*—Chalk, Guaicum, Castor Oil and Brandy Mixtures, and Aromatic, and Aromatic Cascara Syrups.
2. **Pulv. Cinnamomi Compositus.** *Syn. B.P.—Pulv. Aromat.*—1 in 3. **B.P. Dose.**—10 to 40 grs. *Enters into.*—Pil. Aloes et Ferri and Pil. Cambog. Co.
3. **Tinctura Cinnamomi.**—1 in 5. **B. P. Dose.**—½ to 1 dr.

OLEUM CINNAMOMI. Oil of Cinnamon.

Source.—The oil distilled from cinnamon bark.

Characters.—Yellowish when fresh becoming reddish gradually. *Sinks in water.* Solubility.—1 in 10 of alcohol. *Impurities.*—Cinnamon-leaf-oil and cassia-oil.

Composition.—(1) *Cinnamic Aldehyde.* (2) *A Terpene.* (3) *Eugenol.*

Action.—Aromatic stimulant, antiseptic. **B.P. Dose.**—½ to 3 ms.

OFFICIAL PREPARATION.

1. **Spiritus Cinnamomi.**—1 in 10. **B.P. Dose.**—5 to 10 ms. *Enters into.*—Acid. Sulph. Aromat.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The actions and uses of the cinnamon bark and its oil resemble those of the cloves and the oil of cloves (*q. v.*), but the bark has besides a mild **astringent** property. As a flavoring and correcting agent both the bark and the oil are used. In **acute dysentery** the bark has been found useful in 60 to 90 gr. doses twice daily. Dr. Drummond has obtained good results from its decoction. The writer has found the bark useful in **mucus diarrhœa.**

CISSAMPELOS. Cissampelos. N.O. *Menispermaceæ.*

(Ind. and Col. Addendum.)

Syn.—False Pareira Brava. **Syn. I.V.**—*Nimuka*, Beng. *Aknádi Nirbisi*, Hind.

medicines more palatable and to prevent griping. The fruit is used in Indian cookery, and its mericarps are chewed with prepared *pán* or sometimes alone to remove the after-taste of drugs. The gently fried and salted mericarps make a pleasant masticatory after meals.

COSCINIUM. Coscinium. N. O. *Menispermaceæ.*

(*Ind. and Col. Addendum.*)

Syn.—False Calumba. **Syn. I.V.**—*Gách-haldi*, Beng. *Jhár-haldi*, Hind. *Dárvi*, *Dáruharidrákam*, Sans. *Mara Munjil*, Tamil.

Habitat.—India, Eastern Colonies.

Source.—The dried stem of *Coscinium fenestratum.*

Characters.—In woody, cylindrical, straight or twisted pieces, about 4 in. in diameter, furrowed longitudinally. Covered with a pale yellowish-grey cork. No odor. Taste bitter.

Composition.—(1) *Berberine.*

OFFICIAL PREPARATIONS.

1. **Infusum Coscinii.**—Coscinium 1 oz., Boilng Water 1 pint. Infuse ½ hour. **B.P. Dose.**—½ to 1 oz.

2. **Liq. Coscinii Conc.**—1 in 2.—Coscinium 10 ozs., Alcohol 90 p.c. 8 ozs., Water 16 ozs. or *q. s.* By maceration and evaporation to 1 pint. **B.P. Dose.**—½ to 1 dr.

3. **Tinctura Coscinii.**—1 in 10. Coscinium 2 ozs., Alcohol 60 p.c. 1 pint. Macerate. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The pieces of cut-root are known as false calumba, because they act as a **bitter, stomachic tonic** like calumba. It has been found to be an efficient bitter tonic after a long trial in the Madras hospitals.

The wood yields a yellow dye closely resembling turmeric.

CREOSOTUM. Creosote.

Source.—A mixture of guaiacol, creosol, and other phenols, obtained in the distillation of wood tar.

Characters.—A colorless or yellowish, highly refractive liquid with an empyreumatic odor and acrid taste. Neutral or faintly acid in reaction. *Solubility.*—1 in 150 of cold, and more in hot water; freely in alcohol 90 p.c., ether, chloroform, glycerin, and glacial acetic acid. *Impurities.*—Phenol, which hardens on cooling, and the less volatile liquids.

Indentification.—Its characteristic smell helps recognition, but it should not be mistaken for that of carbolic acid. Its color is not reliable.

Composition.—(1) *Guaiacol*, soluble 1 in 80 of water, and freely in alcohol 90 p.c., glycerin and fixed oils. (2) *Creosol*, soluble 1 in 150 of water, and sparingly in glycerin.

Incompatibles.—Silver salts (see p. 111.)

Action.—Antiseptic, disinfectant, deodorant. **B.P. Dose.**—1 to 5 ms. *Maximum single dose.*—30 to 60 ms. gradually increased.

OFFICIAL PREPARATIONS.

1. **Mistura Creosoti.**—1 m. in 1 oz. **B. P. Dose.**—½ to 1 oz.
2. **Unguentum Creosoti,**—1 in 10.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Oro-nasal Inhalations.**—Creosote or a mixture of Creosote, Phenol, Terebene, &c. Is used to medicate respirators.

2. **Vapor Creosoti. B. P. 1885.**—Creosote 12 ms., Boiling Water 8 ozs. Useful in phthisis, bronchitis, gangrene of the lungs, &c.

3. **Creosotal.** *Syn.—Creosote Carbonate.*—A viscid, amber-colored, almost odorless and tasteless liquid, insoluble in water, containing carbonates of guaiacol and creosol. *Dose.*—5 to 20 ms.

4. **Creosote Phosphate.** *Syn.—Phosote.*—A yellowish oily liquid insoluble in water. *Dose.*—5 to 20 ms.

5. **Creosote Phosphite.** *Syn.—Phosphotal.*—In glacial crystals.

6. **Creosote Tannate.** *Syn.—Tannosal.*—A brown powder dusted like iodoform, soluble in water. In phthisis. *Dose.*—5 to 15 grs.

7. **Creosote Valerianate.** *Syn.—Eosote.*—An oily liquid used in phthisis epidermically. Checks gastric fermentation. *Dose.*—3 to 12 grs.

8. **Creosoform.**—A compound of creosote and formaldehyde.

9. **Guaiacol.**—*Medicinal guaiacol* is the chief constituent of beech creosote. *Synthetic Guaiacol* is prepared from pyrocatechin in crystals. Considered to have **lethal action** on **bacilli** of **tuberculosis.** Used as a substitute for creosote. Acts as **antipyretic** when 15 to 30 ms. are painted over the skin, and the part is covered with oiled silk or gutta-percha tissue. It also acts as an **anæsthetic** when injected into, or painted over, painful nerves. Sometimes it produces cardiac-weakness. *Dose.*—1 to 5 ms. May be hypodermically injected dissolved in almond or olive oil.

10. **Guaiacol Benzoas.** *Syn.—Benzosol.*—In colorless almost odorless and tasteless crystals. It is less nauseous but it is difficult to get it pure. Useful in incipient phthisis. *Dose.*—4 to 12 grs.

11. **Guaiacol Carbonas.** *Syn.—Duotal.*—A colorless crystalline, tasteless powder. Used as a substitute for guaiacol, with sugar or in cachets. This is largely used in phthisis. *Dose.*—5 to 15 grs.

12. **Guaiacol Valerianas.** *Syn.—Geosote.*—A liquid combination of Valerianic Acid and Guaiacol. *Dose.*—3 to 8 ms. in capsules.

13. **Guaiacetin.** *Dose.*—5 to 8 grs. *Syn.—Sodium Pyro-catechin-mono-acetate.*

14. **Guaiacol Salol.** *Syn.—G. Salicylate.*—A good intestinal disinfectant. *Dose.*—10 to 15 grs.

15 **Thiocol.** *Syn.—Potassium-guaiacol-sulphonate.*—In infantile tuberculosis. *Dose.*—15 grs.

PHARMACOLOGY.

Externally.—The action of creosote is very much similar to that of carbolic acid, creosote being an **antiseptic, disinfectant,** and **deodorant,** but as it is a complex product, its action is not always uniform, and cannot therefore be relied upon. Painted like guaiacol or rubbed into the skin it acts as an **antipyretic.**

Internally. **Gastro-intestinal tract.**—When applied to the mouth, it produces smarting and salivation, and destroys epithelium. In the stomach, it is supposed to depress the terminal filaments of the sensory nerves of the mucous membrane, and to arrest **putrefactive** and **fermentative processes** by destroying low vegetable organisms, such as torulæ and sarcinæ without affecting the pepsin. Large doses cause nausea, vomiting, colic and diarrhœa, with frequent pulse and slow and laboured respiration, without producing any convulsions.

Secretions.—It is readily absorbed into the blood, and undergoes no change in it. It is **eliminated** by the **bronchial mucous membrane** and **kidneys,** which it **stimulates,** increasing the bronchial and urinary secretions and if fœtid, removing their fœtor.

Micro-organisms.—It seems to act as a poison to microbes, especially to bacilli tuberculosis, either during the process of elimination, or when locally brought into contact, as by inhalation.

THERAPEUTICS.

Externally.—Like carbolic acid, it cannot be used as a **general antiseptic** on account of its indefinite composition. The official ointment is useful in **ulcers, scaly skin diseases** and some forms of **eczema.** Creosote vapor or creosote spray is a useful inhalation in **chronic bronchitis, phthisis, gangrene** of the **lungs,** &c.

Internally. **Gastro-intestinal tract.**—A pellet of cotton-wool soaked in creosote relieves **toothache** when introduced into the painful carious tooth. In minute doses, 1 to 3 ms., it has been found to relieve **nausea, vomiting** and **gastralgia,** caused either by any local mischief or by reflex irritation. It checks also **fermentative dyspepsia** and **diarrhœa,** when given with bismuth and alkalis. It is an excellent remedy for **sloughing dysentery** when given alone, but not with nitrate of silver, so as to avoid the formation of a combustible compound. Dr. V. de Holstein considers it to be the most effective remedy for **chronic constipation,** in 1 to 2 ms. doses gradually increased to 7 to 8 ms.

Lungs.—Both creosote and guaiacol are considered to be almost specifics for **phthisis,** because of their lethal effects on the bacilli tuberculosis. They must be commenced early and continued long and in increasing doses. The sooner the constitution is brought thoroughly under its influence the better. Commencing with 5 to 10 m. doses, it may be given up to 60 ms. Carbonates are more easily borne. Given with quinine the febrile symptoms soon abate.

Prescribing hints.—Creosote may be given by the mouth, rectum, hypodermically mixed with almond oil, rubbed into or applied to the skin, or inhaled. By the mouth it is best given in pilules, capsules, perles, emulsions or mixed with milk or cod-liver oil. As creosote and guaiacol may upset the stomach, any of their preparations, such as creosotal or duotal, &c., may be used. Most of the methods may be simultaneously employed in the treatment of phthisis. Sometimes the mucus secretion of phthisis is wonderfully arrested by using creosote spray. During hæmoptysis creosote treatment must be withheld. It sometimes keeps up the expectoration and a mild form of hæmoptysis, if continued too long.

CRETA PRÆPARATA. See page 290.

CROCUS. Saffron. N.O. *Iridaceæ.*

Syn. I.V.—*Jáfrán*, Beng. *Keshar*, Hindi. *Kumkuma*, Sans.

Habitat.—Spain, Kashmir, Persia.

Source.—The dried stigmas and tops of the styles of *crocus sativus.*

Characters.—Each portion 1 in. long, consists of three orange-red stigmas, thickened and tubular above, notched at the extremities, and united below to the top of the yellow style Flexible and unctuous to touch ; odor aromatic ; taste bitter, aromatic ; gives orange-yellow color to the fingers when rubbed, and to warm water. *Impurities.*—Marigold and saffron petals, stamens, chalk, coloured powders, oil, barium sulphate, lime, magnesia, &c.

Identification.—Its characters and flavor are characteristic. A lens may be used to distinguish foreign substances.

Composition.—(1) *Polychroite* or *Crocin*, an orange-red glucoside. (2) A *Volatile Oil.*

Enters into.—Decoct. Aloes Co., Tr. Cinch. Co., and the

OFFICIAL PREPARATION.

1. **Tinctura Croci.**—1 in 20. Bright yellowish-brown. **B.P.** **Dose.**—5 to 15 ms.

USES.

Saffron is chiefly used as a coloring and flavoring agent, but it is very expensive. Many Indian dishes are colored and flavored by it.

CROTONIS OLEUM. Croton Oil. N.O. *Euphorbiaceæ.*

Syn. I.V.—*Jaipáler tel*, Beng. *Jámálgotá ke tel*, Hind.

Habitat.—India, Ceylon, Indian Archipelago.

Source.—The oil expressed from the seeds of *Croton Tiglium.*

Characters.—Brownish-yellow to dark reddish-brown, viscid. Odor disagreeable. Taste acrid, burning. *Solubility.*—In ether, chloroform, olive oil, partially in alcohol 90 p.c.

Identification of seeds.—The seeds are non-official, but they should be diagnosed. They are oval or oblong, dark-bown, marked with ramifications of the raphé. They resemble castor-oil seeds, which are brighter, polished and mottled.

Composition.—(1) *Crotolinic Acid*, which appears to be the active principle. (2) *Tiglic Acid* or *Methyl crotonic acid*. (3) *Crotonol*, which is non-purgative, but an irritant to the skin. (4) Several *Volatile Acids*, which give odor. (5) Several *Fatty Acids*.

Action.—Pustulant, drastic purgative. **B.P. Dose.**—½ to 1 m.

OFFICIAL PREPARATION.

1. **Linimentum Crotonis.**—1 in 8. A counter-irritant.

PHARMACOLOGY.

Externally.—Croton oil powerfully irritates the skin, producing burning, redness and a crop of vesicles, which soon turn into pustules, leaving unsightly scars. Hence, it is a **powerful irritant** and a **pustulant.** Its action is intensified when it is mixed with alkalis.

Internally. **Gastro-intestinal tract.**—Taken undiluted it is an irritant to the mouth and fauces. In a short time after a drop has been swallowed, griping, and abdominal heat and pain are felt, followed in an hour or two by purging, which repeats itself several times ; the stools getting more and more watery and the intervals shorter and shorter. It is therefore a **drastic purgative**. This action is probably due to its direct irritant effect on the stomach and intestines. Their mucous membrane becomes red and œdematous, and the intestinal peristalsis and secretion are considerably increased. Its action is greatly heightened by its admixture with the alkalis of the bile and other alkaline secretions in the small intestine. In large doses the stools towards the end contain blood and mucus, and there is a considerable general depression, leading sometimes to death from collapse. The action of croton oil is not entirely local, for it may purge if it is applied to the skin. It does not stimulate the liver and is thrown off in the stools.

Antidotes.—In a case of an over-dose of, or poisoning by, croton oil, wash out the stomach with gruel and mustard, or olive oil, or diluted milk (4 ozs. in 1 pint of water), and give demulcent drinks, such as linseed tea, milk-whey, gruel, &c, Opium internally or in the form of an enema, stimulants, &c.

THERAPEUTICS.

Externally.—As a *counter-irritant* it is scarcely used now, though in former times its liniment was employed in **phthisis**, acute and chronic **bronchitis**, **pleurisy** and in chronic inflammatory conditions of the joint. The oil is recommended in obstinate **ring-worm** of the scalp, but the risk of suppuration and baldness counter-balances its use. The diluted liniment, or croton oil well diluted with olive oil (5 ms. to 1 oz.), is sometimes used in **alopecia**, but cantharides is a better and safer hair restorer.

Internally.—Croton oil is used only on rare occasions. As a *purgative* it is invaluable in **cerebral hæmorrhage, coma,** and

insanity on account of its minute dose and rapid and complete evacuation of the bowels. In **obstinate constipation** and **intestinal obstruction** from impacted fæces, where there is no structural or inflammatory complication, croton oil may be given with benefit, but not till other purgatives have been tried. According to Brunton, croton oil 1 drop with 1 dr. of chloroform in glycerin 1 oz. removes **tapeworm** when other remedies fail. It may also be given in **dropsy, hydrocephalus, uræmia, delirium tremens,** &c.

Caution.—It must not be given to weak subjects, pregnant women, children, and those who suffer from piles, prolapse of the rectum, or chronic diarrhœa and chronic dysentery. It is inadmissible in inflammatory conditions of the stomach, intestines and peritoneum, and in organic obstruction of the bowels.

Prescribing hints.—Croton oil is usually given in pill (see p. 88) alone or mixed with compound colocynth pill. It is best given with butter or jaggery to patients who are quite unconscious, as in apoplexy, on the back of their tongue. If used externally, vesication should be avoided and the patient warned against conveying the application to the face or scrotum, lest there should be a severe inflammation. The maximum dose should not exceed 2 ms. a day.

CUBEBÆ FRUCTUS. Cubebs. N.O. *Piperaceæ.*

Syn. I.V.—*Kábáb chini*, Beng. Hindi.

Habitat.—Java and the Moluccas.

Source.—The dried full-grown unripe fruit of *Piper Cubeba.*

Characters.—Globular, ⅙ in. in diameter, black, wrinkled, tapering below into a rounded stalk, odor strong, aromatic ; taste bitter, aromatic. Genuine crushed fruit imparts a crimson color to H_2SO_4.

Identification.—Cubebs may be mistaken for Pepper and Pimento, but the wrinkled black appearance with the *stalk attached*, and its characterestic odor at once identify it. The powdered cubebs is reddish-brown and has a marked odor. Few fruits when chewed produce a sensation of cold in the mouth.

Composition.—(1) The *Volatile Oil* (*off.*) 6 to 15 p. c. (2) *Cubebin*, a neutral body. (3) A *Resin*, containing *cubebic acid.* (4) *Piperine.* (5) A *fatty oil.* (6) *Gum.*

Action.—Aromatic, stimulant, diuretic. **B. P. Dose.**—30 to 60 grs.

OFFICIAL PREPARATIONS.

1. **Oleum Cubebæ.**—A pale-green, yellow or colorless oil, smelling of cubebs, distilled from cubebs. Sp. gr. 0·910 to 0·930. **B.P. Dose.**—5 to 20 ms.
2. **Tinctura Cubebæ.**—1 in 5. **B. P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Externally.—The action of cubebs depends upon the oil and the resin which it contains. It causes **rubefaction** when rubbed into the skin.

Internally.—**Gastro-intestinal tract.**—The action of cubebs here resembles that of pepper. In small doses, it is a **stimulant, stomachic** and **carminative,** and in large doses it impairs digestion. In still larger doses it causes **gastro-intestinal irritation.**

Respiratory and **genito-urinary tracts, &c.**—Like many oleo-resins, cubebs enters the blood and is carried to different tissues and organs, upon which it acts more or less like copaiba. It **stimulates** the **secretions** of the mucous membranes of the **respiratory** and **genito-urinary passages,** and renders them aseptic. It also stimulates the action of the kidneys, and to some extent that of the skin. Sometimes it causes **erythema.**

Elimination.—It is chiefly excreted in the bronchial secretion and urine, and is probably found in the latter in the form of salt of cubebic acid, which may be precipitated by HNO_3. Many of the specific germs are destroyed by the products of the volatile oil as they pass out.

THERAPEUTICS.

Internally.—Unlike copaiba cubebs is often used in the form of lozenges or inhalation to relieve **coughs, colds** and **sore-throat.** Its cigarettes sometimes relieve a fit of **asthma.** On account of its specific action on the genito-urinary passages, it is often largely employed with copaiba in acute or chronic **gonorrhœa, gleet** and chronic **cystitis.** Occasionally, it is found serviceable in **chronic bronchitis.**

Prescribing hints.—The powdered cubebs may be given in lozenges, cachets, or as a paste with copaiba (see p. 359), and the oil in capsules, or in emulsion, often with copaiba, buchu, &c. (see p. 360).

CUCURBITÆ SEMINA PRÆPARATA.

N.O. *Cucurbitaceæ.*

Melon Pumpkin Seeds. Redgourd Seeds.

(*Ind. and Col. Addendum.*)

Syn. I.V.—*Biláti Kumrár bij*, Beng. *Mithákadu ká bij*, Hind.

Habitat.—Mediterranean Colonies.

Source.—The prepared fresh ripe seeds of cultivated plants of *Cucurbita maxima* (*Cucurbita Pepo*).

Characters.—Flat, ovate, white exalbuminous, consisting of two cotyledons deprived of testa and tegmen. The seeds must not be more than one month old.

Composition.—(1) An *Oil,* expressed from the seeds.

B.P. Dose.—3 to 4 ozs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Both the seeds and the oil are efficient **anthelmintic** for **tapeworm.** The former are best given bruised with a little water or milk on an empty stomach early in the morning, followed by a simple purgative at 10 A.M.; the latter in ½ oz. doses repeated at an interval of 2 hours and then followed by an aperient.

The plant, fruit and seeds are eaten by the natives of India.

CUPRI SULPHAS. Copper Sulphate. $CuSO_4, 5H_2O$.

Syn.—Blue vitriol, Bluestone. **Syn. I.V.**—*Tutia*, Beng. Hind.

Source.—Obtained by the interaction of water, sulphuric acid, and copper or cupric oxide.

Characters.—In blue triclinic prisms. *Solubility.*—1 in 3.5 of cold water. Solution acid. *Impurities.*—Iron and other metals.

Identification.—Its blue color and shape help recognition.

Incompatibles.—Alkalis and their carbonates, lime water, mineral salts (except sulphates), iodides and many vegetable astringents.

Action.—Caustic, astringent, emetic, tonic. **B.P. Dose.**—As an astringent, ¼ to 2 grs., as an emetic, 5 to 10 grs.

NON-OFFICIAL PREPARATIONS.

1. **Lapis Divinus.** *Syn.*—*Cuprum Aluminatum.*—Powdered Copper Sulphate, Potassium Nitrate and Alum, of each equal parts fused in an earthen crucible, $\frac{1}{50}$th part of powdered camphor being added towards the end. 2 grs. in 1 oz. of distilled water makes a good **eye-wash.**
2. **Ung. Cupri Oleatis.**—Copper Oleate 1, Lard 4; melt and mix. An excellent antiseptic and parasiticide. Useful in ringworm, hard and horny warts, and corns.

PHARMACOLOGY.

Externally.—Copper sulphate has no action on the unbroken skin, but is a **caustic** when applied to a raw surface and exposed delicate mucous membrane, as conjunctiva. In diluted solutions it constringes local blood-vessels, and it is therefore a **local astringent.**

Internally. **Gastro-intestinal tract.**—It colors the bases of the teeth (not gums) green when long continued, by combining directly with the decomposing products deposited there. In small medicinal doses, it acts as an **astringent**, and in large doses 5 to 10 grs. as an **emetic** like zinc sulphate. Emesis is caused partly by its direct local action on the stomach, and partly by the stimulation of the vomiting centre. It causes less depression and less after-nausea. If it fails to induce vomiting, the stomach must be soon emptied by other means, otherwise **gastro-enteritis** would result.

Remote Action.—In minute doses copper sulphate is absorbed as an albuminate, and is said to act on the body like arsenic. It promotes assimilation and increases strength and flesh. Hence it is an **alterative** and **nervine tonic.** It paralyses the cardiac and the respiratory centres. During elimination through the intestinal mucous membrane, it acts as a **remote astringent.** It is stored in the liver.

Elimination.—Copper salts are thrown off by the gastro-intestinal mucous membrane, bile, urine, saliva, and sweat.

Acute toxic action is rare. In large doses copper salts produce violent gastro-intestinal irritation, with paralysis of the cardiac and respiratory centres.

Antidotes.—Emetics or stomach-pump if there is no free vomiting; white of egg, milk or demulcent drinks, yellow prussiate of potassium, followed by opium and warm poultice over the stomach.

Chronic toxic action.—Many workers in copper or brass may suffer from anæmia, headache, debility, emaciation, indigestion, tremors, laryngeal and pharyngeal catarrh, occasional hæmoptysis, salivation, a green line at the bases of the teeth and occasional colic. In short a condition not unlike that of lead-poisoning.

THERAPEUTICS.

Externally.—Copper sulphate is used to destroy **exuberant granulations**, and to stimulate **indolent sores.** Being not so strong as silver nitrate, it causes less pain when applied to **granular lids**, and to the edges of the eye-lids in **tinea tarsi.** In the form of a lotion (2 to 4 grs. to 1 oz.) it is very serviceable in **sluggish ulcers** and **chancres**; and as an injection in **gonorrhœa, gleet** and **leucorrhœa**, but it must be remembered that copper lotions are more powerful than those of zinc sulphate.

Internally.—It is chiefly used for its **astringent** property in obstinate dysentery, and **severe diarrhœa**, especially that of tuberculosis. For its **emetic** action, it is occasionally used in narcotic poisoning, and to expel false membrane or mucus from the air passages in **diphtheria, laryngitis, croup** and **bronchitis**, especially where ipecacuanha fails. It is a valuable **antidote** in **poisoning** by **phosphorus**, for copper is deposited over phosphorus and is rendered inert. 3 grs. of copper sulphate should be given every few minutes until vomiting is induced and then a saline laxative. As a tonic it has been given in **epilepsy** without much success. It is supposed to cure **chlorosis.**

CUSPARIÆ CORTEX. Cusparia Bark. N.O. *Rutaceæ.*

Syn.—Angustura bark.

Habitat.—Tropical South America.

Source.—The dried bark of *Cusparia febrifuga.*

Characters.—In flattened or curved pieces or quills, 4 or 5 in. long, 1 in. wide, $\frac{1}{12}$ in. thick. Outer layer grey or yellowish corky which can be removed, disclosing a hard, dark-brown inner layer. Inner surface light-brown and laminated. Fracture short, resinous, showing white points. Odor musty. Taste bitter. *Impurity.*—Bark of *Strychnos Nux Vomica* (false angustura bark), whose inner surface gives bright blood-red color with HNO_3 indicating *brucine*; whilst cusparia bark does not.

Composition.—(1) *Cusparine* or *Angusturine*, a crystalline bitter alkaloid. (2) *Galipeine*, an alkaloid. (3) *Galipidene*, an alkaloid. (4) *Cusparidine*, also an alkaloid. (5) An *Aromatic Oil*. No tannin.

Incompatibles.—Mineral acids and metallic salts.

Action.—Bitter tonic.

Official Preparations.

1. **Infusum Cuspariæ.**—1 in 20 (¼ hour). **B.P. Dose.**—1 to 2 ozs.
2. **Liquor Cuspariæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Cusparia is used to make Angustura Bitters. It has **aromatic, tonic** and **febrifuge** properties, and in large doses produces gastro-intestinal irritation. It is useful in **tropical fevers**, especially **intermittents**, and in **dysentery**. It is largely employed in South America.

CUSSO. Kousso. N.O. *Rosaceæ.*

Habitat.—Abyssinia.

Source.—The dried panicles of pistillate flowers of *Brayera anthelmintica.*

Characters.—In cylindrical rolls, 1 to 2 ft. long. The panicles much branched, the branches arising from the axils of large sheathing bracts, covered with hairs and glands. Flowers numerous, small, shortly stalked, unisexual, with two roundish membranous veined bracts at the base. Calyx hairy, veiny, with two whorls of 5 segments each. No odor. Taste bitter, acrid.

Composition.—(1) *Koussin*, a neutral active principle. (2) *Oil, Gum, Resin* and *Tannic Acid.*

Action.—Anthelmintic for tapeworm. **B.P. Dose.**—¼ to ½ oz.

Pharmacology and Therapeutics.

In official doses kousso is a valuable **anthelmintic** for three varieties of tapeworm which are readily killed by it. It is not much used either in this country or in England. In large doses it causes vomiting and slight diarrhœa.

The powdered flower in compressed masses or suspended in an aromatic water is more efficacious than its infusion. The action of kousso is more certain when given on an empty stomach and followed by an aperient. The entozoa are expelled dead, and sometimes in pieces. The infusion may be prepared by boiling 2 to 4 drs. of the flower in 4 ozs. of boiling water for ¼ hour. It should not be strained.

DATURÆ FOLIA. Datura leaves. N.O. *Solanaceæ.*

(Ind. and Col. Addendum.)

Habitat.—India, Eastern and West Indian Colonies.

Source.—The dried leaves of *Datura Fastuosa*, and of *Datura Metel.*

Characters.—Ovate, acuminate, with long petioles and sinuate-dentate margins. 7 to 8 in. long, 4 to 5 in. broad. Odor characteristic. Taste bitter.

DATURÆ SEMINA. Datura Seeds.

(*Ind. and Col. Addendum*).

Source.—The dried seeds of *Datura Fastuosa.*

Characters.—Wedge-shaped; rounded, thickened, furrowed, wavy margins, compressed laterally; $\frac{1}{6}$ to $\frac{1}{5}$ in. broad, $\frac{1}{25}$ in. thick. Hilum on one edge. Testa finely pitted, reticulated Taste bitter.

Official Preparation.

1. **Tinctura Daturæ Seminum.**—Seeds bruised 5 ozs., Alcohol 70 p.c. *q.s.* to 1 pint. By percolation. **B.P. Dose.**—5 to 15 ms.

Pharmacology and Therapeutics.

The action and uses of the leaves and seeds are the same as those of the stramonium leaves and seeds (*q.v.*), but they may be officially used in their habitats.

DIGITALIS FOLIA. Digitalis Leaves. N.O. *Scrofulariaceæ.*

Syn.—The purple Foxglove Leaves.

Habitat.—Britain.

Source.—The dried leaves of *Digitalis purpurea*, collected from plants commencing to flower.

Characters.—4 to 12 in. long, 5 to 6 in. broad, with a winged petiole, ovate or ovate-lanceolate, subacute, crenate. Upper surface somewhat rugose, dull green, slightly hairy. Under surface paler pubescent, with prominent veins. No odor. Taste very bitter.

Identification.—The crenate-dentate margin and the prominent white net-work of veins on the under surface at once enable a student to diagnose it. The latter character may help him to make it out even when in fragments.

Composition.—Five active principles (all glucosides).—(1) *Digitonin*, (2) *Digitalein*, (3) *Digitalin*, (4) *Digitoxin*, (5) *Digitin.* Two acids—(1) *Digitalic* and (2) *Antirrhinic.* Other constituents, such as *starch*, *coloring matter*, *gum*, *tannin*, *volatile oil*, *salts* and *sugar.*

Incompatibles.—Iron persalts, lead acetate, cinchona. In practice it is often given with iron and cinchona.

Action.—Cardiac tonic, diuretic. **B.P. Dose.**—$\frac{1}{2}$ to 2 grs.

Official Preparations.

1. **Infusum Digitalis.**—1 in 146 nearly. Contains more digitonin which is allied to saponin, and is therefore a more active diuretic. **B.P. Dose.**—2 to 4 drs.
2. **Tinctura Digitalis.**—1 in 8. Dark-brown. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Inf. Digitalis Conc. B.P.C.**—Leaves 480 grs., Alcohol 90 p.c. 5 ozs., Water *q.s.* to 1 pint. Thrice macerated. Has 8 times the strength of inf. digitalis. *Dose.*—15 to 30 ms.

2. **Pil. Hyd. et Digit. Comp. St. Bart.**—Mercurial pill 1 gr., Digitalis 1 gr., Squill 1 gr., Ext. of Henbane 2 grs.

3. **Succus Digitalis. B.P.C.**—Juice 3, Alcohol 90 p.c. 1. *Dose.*—5 to 15 ms.

4. **Digitalin.**—Under this name 4 varieties are found in the market.—

(*a*) **Digitalin Amorphous** (*Homolle*).—Is of uncertain composition and is not much used now. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr. in granules.

(*b*) **Digitalin crystallised** (*Nativelle*).—Consists mostly of digitoxin in light-white needles, soluble in chloroform, insoluble in water. Is cumulative. *Dose*—$\frac{1}{250}$ to $\frac{1}{60}$ gr. in pill.

(*c*) **Digitalin German.**—Consists mostly of digitalein, digitonin, and digitalin. Amorphous, soluble in water. *Is most suitable for hypodermic use. Dose*—$\frac{1}{60}$ to $\frac{1}{30}$ gr.

(*d*) **Digitalinum Verum** (*Kiliani*).—Its composition is definite, and is non-cumulative. Is soluble 1 in 1000 of water. *Dose.*—$\frac{1}{270}$ gr.

5. **Digitoxin** (*Schmiedeberg*).—In minute white crystals. Recent investigators consider it to be the active principle. *Dose.*—$\frac{1}{250}$ to $\frac{1}{60}$ gr.

PHARMACOLOGY.

Externally.—The leaves gently irritate the skin. The writer has seen a case in which mild toxic symptoms were developed from their application to the inflamed scrotum after they had been softened by soaking in hot water.

Internally. **Gastro-intestinal canal.**—Small doses appear to have no action. Large and continued doses induce vomiting and purging. Digitalis is therefore a **mild gastro-intestinal irritant.**

Blood.—Its active principles are readily absorbed, but they are not known to affect the blood.

Heart.—Digitalis not only acts on the heart, but on the blood-vessels too. It (1) **slows the beat** of the **heart,** (2) **increases** the **force** of its **contraction,** and (3) **lengthens the diastole** without affecting the duration of systole. Consequently, the **pulse** becomes **regular** and **slower** if it had been irregular and frequent, and its **tone improves** if it had been low. These actions are therefore most valuable therapeutically for following considerations—(*a*) The slowing of the heart allows the left ventricle to be better filled and a larger wave of blood sent into the aorta. (*b*) It helps the veins to be better emptied and arteries better filled. (*c*) It aids the pulmonary veins to empty themselves more thoroughly into the left auricle and left ventricle and allows the left ventricle to drive the blood more easily, thereby lessening the engorgement in the abdominal cavity and limbs. (*d*) The increased contractile force tends to lessen the mitral orifice and thereby helps to propel the blood onwards with a diminished regurgitation. It has been experimentally seen in animals, that in large doses the contraction becomes so strong that almost every drop of blood is squeezed out of the organ. But the spasmodic contraction observed in frogs is due, according to Brunton, to the local injury done to the heart during experiment, rather than to the drug. In frogs the heart is arrested in systole, but in mammals in diastole. Dr. Hare has shown by administering digitalis to young pigs for four-and-a-half months, that there are genuine growth and hypertrophy of the cardiac muscle as well as the increased weight of the organ. It has also been observed that in small doses digitalis actually **increases the amount of work** done in a given time, *i.e.*, a greater output with each ventricular contraction.

The action of digitalis on the heart is performed in a complicated manner, and is chiefly due to (1) the **direct action** of digitalis on the **involuntary muscular fibre** of the heart, (2) the **increased activity of the inhibitory pheripheral end of the vagus,** and (3) partly to the **stimulation of the vagal centre.** According to Cushny the vagal action commences a little before the muscular.

Blood vessels.—In moderate doses digitalis greatly **increases the blood-pressure,** caused partly by the **greater cardiac force,** and partly by the **contraction of the arterioles,** from its direct action on the **involuntary muscular fibre,** and perhaps on the nervous apparatus (?) contained in the arteries, as has been pointed out by Brunton. The **vasomotor centres** in the **medulla** and **cord** are also slightly stimulated by digitalis, and thus, to a certain extent, contributes to the rise of the blood--pressure. In toxic doses digitalis paralyses the vagal and other centres, as well as the muscular coat of the arterioles, and therefore the blood-pressure falls from the relaxation of the vessels.

The action of digitalis on the blood-pressure of an animal, as is seen from a tracing taken by Dr. Tuncliffe, may fairly be divided into four stages thus :—

First.—Slowing of the heart (pulse), rise of the blood-pressure and greater oscillations due to the action of digitalis on the heart and contraction of the arterioles.

Second.—Very rapid pulse and still high blood-pressure, due to the depression of the vagus ; the contraction of the arterioles being maintained.

Third.—Still rapid pulse, beginning of the relaxation of the vessels, and falling of the blood-pressure.

Fourth.—Further diminution of the pressure, weakening and again slowing of the pulse, from the paralysis of the heart. (See Action of Medicines by Brunton, 1901, p. 313).

From what has just been stated it becomes evident that the pulse alters materially in character with the pushing on of the drug. It becomes at first slow, then gradually intermittent, then more frequent though interpolated, and lastly rapid but fairly regular. The effects pass off in the reverse order.

Respiration.—This is only secondarily affected from imperfect circulation in toxic doses.

Temperature.—In medicinal doses it has no influence on the temperature, but in toxic doses it reduces it even in health. How this occurs we do not know.

Nervous system.—In medicinal doses it has no influence on the brain, cord, and sensory and motor nerves. In large doses it causes giddiness, headache, dimness of sight and disturbed hearing. Flashes of light, and a blue halo around bright objects also appear before the eyes. All these symptoms are probably due to some disturbance in the cerebral circulation. The reflex excitability and motor nerves are depressed only by toxic doses.

Kidney.—The action of digitalis on this organ is uncertain. In health, it may or may not cause diuresis. Lauder Brunton by experiments on his own person has found "while small doses *have* little or no action, marked diuresis occurs when the drug *is* pushed so as to produce symptoms of poisoning." But, with other observers the result is different. In heart disease it very often acts as a powerful **diuretic**, though not always so. The cause of this uncertainty of action may be explained, if we accept the theory that if the arterioles of the kidney like the rest of the body are tightly contracted, very little blood will flow through them and therefore little urine will be secreted ; but, if on the other hand, the renal vessels are not so much contracted, the increased cardiac force and the rise of the blood-pressure will drive more blood to the kidney, and there will consequently be a free diuresis. Some consider that in small doses, or in the first stage of a large dose, the vessels of the kidney are constricted along with the rest of the body, and the quantity of urine secreted is therefore diminished. But as the renal arterioles are the first to dilate while the general blood-pressure is still high, free diuresis ensues. Kobert has shown that digitalin contracts all vessels, while digitoxin and digitalein dilate the renal vessels while contracting all others. It is a known fact that the leaves which contain more digitonin (see p. 371) are most powerful diuretic.

It has no action, as far as we know, on the composition of urine.

Uterus.—The muscular fibres are supposed to be stimulated to contraction.

Cumulative action.—Digitalis when given for a long time, sometimes suddenly shows symptoms of poisoning even when its dose has not been increased. This is known to be the **cumulative effect of the drug**, and is due to the retardation of its excretion by the kidneys from the contraction of the renal vessels. The active principles, not being eliminated as fast as they are absorbed, accumulate in the system. The first indication of this cumulative action is the scanty secretion of urine.

Elimination.—It is chiefly excreted by the kidneys and partly by the gastro-intestinal mucous membrane.

Toxic action.—Large doses cause nausea, vomiting and purging ; the vomit is grass-green, and is probably due to the action of gastric juice on some ingredients of digitalis. The other symptoms have already been described.

Antidotes.—Emetics or pump. Strong coffee, or tannin in solution and in large draughts. Stimulants—brandy, whisky, ammonia, &c. Warmth to the extremities. Aconite (5 ms. of tincture), or aconitine $\frac{1}{120}$ gr. hypodermically. Opium. Absolute rest and *recumbent position* are essential.

Physiological antagonists.—Aconitine, muscarine, scoparin, and saponin. Except aconite in practice they are not used as antidotes. We therefore append a table showing the comparative antagonism between digitalis and aconite.

Digitalis.	Aconite.
1. A powerful cardiac tonic. The force of cardiac contraction is increased.	A powerful cardiac sedative. The force of cardiac contraction is diminished.
2. The arterial tension is increased from the contraction of vessels. The pulse becomes regular if intermittent.	The arterial tension is diminished from the relaxation of vessels. The pulse becomes irregular.
3. The blood-pressure considerably rises.	The blood-pressure considerably falls.
4. Action slow.	Action rapid.
5. Is cumulative.	Is not cumulative.
6. A powerful diuretic under certain conditions.	A feeble diuretic on certain conditions.

Resemblance of action.—The following drugs more or less resemble digitalis in action on the circulatory system :—Strophanthus, erythrophlœum (casca bark), adonis vernalis, convallaria majalis, cactus grandiflora, scillain (scilla), sparteine (broom), heleborein (helleborus niger), and barium chloride.

THERAPEUTICS.

Externally.—Digitalis is not used now.

Internally.—It is the most valuable remedy we have for the diseases of the heart, and affords relief, according to Ringer, by either one or more of the following ways :—

1. "By strengthening the action of a weak heart.
2. By reducing the strength of the beats of a heart acting too powerfully.
3. By lessening the frequency of the heart's beats.
4. By correcting irregular action of the heart.
5. By increasing tonicity and so lessening the size of the cavities of the heart, thereby obviating the condition of over-distension in which the stretched ventricles are unable to contract upon their contents, a condition threatening complete a systole."

Mitral regurgitation and **constriction.**—Digitalis has a wonderful influence in restoring a **dilated** and **weakened ventricle** to a state of efficiency. Under its use a quick, weak and irregular rhythm becomes slower, stronger and regular. As the **diastolic period is prolonged,** the heart gets more time for nutritive repair, and for more efficient subsequent contraction, from the flowing in of more blood from the dilated auricle and right side of the heart. By its powerful **diuretic action,** and **lessened pressure in the pulmonary circulation,** digitalis relieves dyspnœa, cough, venous engorgement of the lungs and of the abdominal organs, œdema, dropsy and many other symptoms due to mitral regurgitation. In short, digitalis is pre-eminently suited for cases which are of a more water-logged type than for those which are not. It equally benefits **mitral constriction** by lengthening the period of diastole, and thereby allowing the normal amount of blood to pass through the constricted orifice. In proportion as this object is gained, the other concomitant symptoms are relieved. Dr. Hare has shown that it causes hypertrophy of the heart. It may therefore be reckoned as the *facile princeps* of the drugs in restoring the balance of imperfect compensation.

Tricuspid regurgitation and **constriction.**—Digitalis acts fairly well in diseases of the tricuspid valves, though not so well as in those of the mitral.

Aortic regurgitation and **obstruction.**—In the first stage of **aortic regurgitation,** digitalis is **useless** or sometimes positively **harmful** ; but in the second stage, when the ventricle dilates, and the auriculo-venticular orifice enlarges, producing **secondary mitral regurgitation,** digitalis then becomes of great value. But even then it must be given with great caution, for sudden syncope may occur if the patient does not lie up. Cases of pure **obstruction** does not require any drugs, as compensatory hypertrophy may gradually take place without them. But when we wish to increase the contractile force of the heart in order to drive more blood through the obstructed aorta, or when from such an obstruction mitral disease has set in, digitalis in small doses does immense good. Unfortunately aortic obstruction is generally accompanied by aortic regurgitation ; hence the difficulty of using digitalis.

Fatty heart.—Digitalis should not be given in the **fatty degeneration** of the **heart,** lest it should rupture, not being able to overcome the resistance caused by the arterial contraction. Though many use it, the risk is great.

Other cardiac diseases.—In many primary diseases of the muscular structure, such as acute or chronic **myocarditis,** with or without vegetative growths, **pericarditis, endocarditis** with or without valvular lesions, digitalis helps to quiet and regulate the action of the heart. Many **functional**

diseases of the **heart**, such as palpitation, irregular cardiac beat due to dyspepsia are benefited by digitalis, but it must be used with caution as it may bring on indigestion. In many **irritable conditions** of the **heart**, especially to persons who take excessively hard exercise, such as rowing or long marches with heavy knapsacks, or to persons of a neurotic temperament, digitalis is considered highly beneficial. The **dilatation** of the **right side** of the heart which so often accompanies chronic diseases of the lungs is also improved by digitalis.

Renal diseases.—It is not safe to use digitalis in **acute Bright's disease** even as a diuretic, for fear of raising the blood-pressure of an acutely inflamed organ ; but when the kidney has become granular and the compensatory hypertrophy of the heart has not been sufficient to overcome the peripheral resistance, and the ventricular dilatation and mitral regurgitation have set in, digitalis—especially the Guy's pill (digitalis, squill and blue pill each 1 gr)—is of signal service. In **chronic Bright's disease** it is positively **harmful**, as it may increase the tension of the already existing high blood-pressure, and thereby cause rupture of a degenerated blood-vessel. In cases of **renal dropsy** complicating scarlatina or cardiac disease, it has often been found efficacious.

Nervous diseases.—In **sleeplessness** at night followed by drowsiness in the day, in anæmic patients, digitalis may act as a **hypnotic** by restoring tone to the relaxed vessels. In moderate doses digitalis is said to be useful in **chronic delirium tremens**, but enormous doses (½ oz. of the tincture) as recommended by Dr. Jones are not a safe method of treatment.

Febrile and **other diseases.**—Digitalis is no more used as a cardiac sedative, but as an antipyretic it is still occasionally used on the Continent. To tone up and slow the excessive action of the heart, digitalis is often prescribed in low forms of **remittent, intermittent, typhoid, scarlet** and **rheumatic fevers.** In **pneumonia** many advocate its use in larger doses, but no doubt its value as an adjunct to other treatment when given in moderate doses, has long been recognised. In **pleurisy,** when the heart becomes embarrassed by the effused fluid, the writer often uses the infusion as a cardiac tonic and diuretic.

Exophthalmic goitre.—Whether given alone or with iron and quinine, digitalis is considered to be a valuable medicine in this disease.

Hæmorrhage.—It is difficult to measure that stage in the action of digitalis, which only causes contraction of the arterioles without the increase of blood-pressure. However, it is given in **epistaxis** and **hæmoptysis.** In **pulmonary hæmorrhage** due to valvular disease, it is very useful. In **menorrhagia** it may be usefully employed, as it tends to contract the uterine blood-vessels, but in hæmorrhage from a **fungoid growth** in the cervix, it is entirely useless.

Caution.—(1) Suspend the administration, or reduce the dose, of digitalis on the first appearance of vomiting, or of a tendency to fainting, or of the scanty secretion of urine.

(2) Never continue the digitalis treatment without intermission. After a week or ten days' use stop it for three or four days. When it is desirable not to stop digitalis, some other cardiac tonics, such as strophanthus, may be used alternately.

(3) Never use digitalis in large doses unless you can see your patient very frequently, especially when the drug requires to be continued long.

(4) Always enjoin a perfect **recumbent position** during a course of digitalis treatment. Never allow your patient to get out of bed even to pass water or stool, or to sit up, particularly in a case of aortic regurgitation, lest there should be sudden fatal syncope.

(5) Never use digitalis if the vessels are **atheromatous**, or in a case of advanced Bright's disease or of fatty heart.

(6) Examine the urine from time to time to ascertain the eliminatory functions of the kidneys.

Prescribing hints.—The fresh infusion and the tincture are the reliable preparations. When the kidneys are to be acted upon, the infusion is to be preferred. (See p. 371). Though incompatible with iron on account of the tannin it contains, digitalis is often given with iron with advantage ; but the resulting inky, ugly mixture can be cleared and made elegant by the addition of diluted phosphoric acid. When the full effects of digitalis are desired, the leaf may be prescribed either in powder or pill, as in Niemeyer's pill (digitalis $\frac{1}{2}$ gr., quinine 1 gr., opium $\frac{1}{4}$ gr.) in phthisis.

ELATERIUM. Elaterium. N. O. *Cucurbitaceæ.*

Syn.—The squirting cucumber. **Syn. B.P. '85.**—Ext. Elaterii.

Habitat.—Britain (cultivated.)

Source.—A sediment from the juice of the fruit of *Ecballium elaterium.*

Characters.—In light, friable, flat or slightly curved opaque cakes $\frac{1}{10}$ in. thick, pale-green or yellowish-grey. Odor faint tea-like. Taste bitter, acrid. *Impurities.*—Starch, flour, chalk.

Identification.—It is easily recognised, as no other drug resembles it. The student should not taste it.

Composition.—(1) *Elaterin* (*off.*) (2) *Prophetin*, a glucoside. (3) *Gummy Matter.* (The official elaterium should contain 25 to 20 p.c. of elaterin.)

Action.—A powerful hydragogue purgative. **B.P. Dose.**—$\frac{1}{10}$ to $\frac{1}{2}$ gr.

ELATERINUM. Elaterin. $C_{20}H_{28}O_5$.

Source.—The active principle of elaterium.

Characters.—In small hexagonal scales, having a bitter taste, colorless, soluble in chloroform. **B.P. Dose.**—$\frac{1}{40}$ to $\frac{1}{10}$ gr.

Official Preparation.

1. **Pulvis Elaterini Compositus.**—1 in 40. **B.P. Dose.**—1 to 4 grs.

Pharmacology.

Internally.—The action of elaterium is identical with that of colocynth, except that it is much more powerful (see p. 355). It produces numerous watery evacuations with considerable griping and prostration, and sometimes nausea, due to the strong stimulation of the glands and muscular coat of the intestines and of the liver. In large doses it causes **violent gastro-intestinal irritation** and occasionally even **peritonitis.** It must mix with the bile before it can operate. It is therefore a very **powerful hydragogue purgative** next to croton oil in the B.P. It increases salivary secretion and when hypodermically injected it purges, and, according to Brunton, causes tetanus and dyspnœa.

Therapeutics.

Internally.—Being a *violent drastic hydragogue purgative*, its use is indicated in cases when we want immediate copious evacuations of the bowels, as in **apoplexy, uræmia, œdema** of the **lungs,** &c. On account of the free discharge of the serum produced by it, it is largely employed in renal, hepatic and cardiac **dropsies,** as in **Bright's disease, cirrhosis** of the **liver,** and **mitral regurgitation.** It is rarely given in constipation.

Caution.—It should not be given to the weak, the old, the pregnant, and to those who suffer from habitual diarrhœa, chronic dysentery, piles, prolapse of the rectum, or cardiac weakness.

Prescribing hints.—The initial dose of elaterium should never exceed $\frac{1}{6}$ gr. and that of elaterin $\frac{1}{20}$ gr. Henbane and aromatic oils correct their griping property. The student should particularly remember the doses of the two drugs, and should not confound elaterium with elaterin. The compound elaterin powder is a safe preparation and may be given in powder or pill. If given in powder, it is better to mix it with butter and to put it on the back of the tongue, to be washed down with a spoonful of water.

EMBELIA. Embelia. N. O. *Myrsineæ.*

(*Ind. and Col. Addendum.*)

Syn. I V.—*Biranga*, Beng. *Baberáng*, Hind. *Vidanga*, Sans.
Habitat.—India, Eastern Colonies

Source.—The fruit of *Embelia ribes*, and of *Embelia robusta.*

Characters.—Globular, $\frac{1}{6}$ in. in diameter, dull red with dark spots o nearly black, containing a horny reddish seed. Taste slightly astrin-ent, aromatic.

Composition.—(1) *Embelic acid*, forming salts with ammonium, potassium and sodium.

NON-OFFICIAL PREPARATION.

1. **Ammonii Embelas.**—In crystalline red needles. *Dose.*—3 to 6 grs. in honey or syrup.

PHARMACOLOGY AND THERAPEUTICS.

These berries are considered a valuable **anthelmintic** for **tapeworm**, and may be used in powder or in infusion (without straining) for the same disease in India and Eastern Colonies. The taste is not unpleasant and the directions are the same as those given for the administration of cusso (see p. 370) or melon pumpkin seeds.

ERGOTA. Ergot. N.O. *Fungi* and *Graminaceæ.*

Syn.—Secale Cornutum, Ergot of Rye.

Habitat.—Spain and Russia. (The Spanish Ergot is the best.)

Source.—The Sclerotium (mycelium or spawn) of *Claviceps purpurea* (N.O. *Fungi*), originating in the ovary of *Secale cereale*, the common rye (N. O. *Graminaceæ*). (Ergot is the diseased rye filled with the mycelium of a small fungus).

Characters.—Subcylindrical or somewhat triangular, tapering, curved, $\frac{1}{3}$ to $1\frac{1}{2}$ in. long, longitudinally furrowed, more on the concave side. Cracked, violet-black externally, pinkish-white within. Odor peculiar, disagreeable, especially if triturated with solution of potassium hydroxide. *Impurity.*—Musty ergot.

Identification.—The peculiar appearance and the odor are enough to identify it. The powder has a greyish brown color and the characteristic smell though not infrequently mixed with that of camphor (see below).

Composition.—(1) *Sphacelinic acid*, (its physiological activity is due to a body called sphacelo-toxin). (2) *Cornutine*, an alkaloid insoluble in water. (3) *Ergotinic acid*, a glucoside. (4) *Ergotinin.* (5) A *fixed oil*, 30 p. c. (6) *Trimethylamine*, which gives the odor. (7) *Tannin*, *coloring matter*, &c. (Its composition is as yet unknown).

Incompatibles.—Metallic salts, astringents.

Dispensing hints.—The entire ergot should be carefully dried over quicklime, not by heat, and kept in perfectly dry air-tight bottles (see p. 7) with a little camphor, in order to preserve it from insects. The powdered drug is soon spoiled.

Action.—Ecbolic, general hæmostatic. **B.P. Dose.**—20 to 60 grs.

OFFICIAL PREPARATIONS.

1. **Extractum Ergotæ.** *Syn.—Ergotin.*—**B.P. Dose.**—2 to 8 grs. in capsules.

2. **Extractum Ergotæ Liquidum.**—1 in 1. **B.P. Dose.**—10 to 30 ms.

3. **Infusum Ergotæ.**—1 in 20. **B.P. Dose.**—1 to 2 oz.

4. **Injectio Ergotæ Hypodermica.** *Syn.—Hypodermic Injection of Ergotin.*—1 in 3. **B.P. Dose.**—3 to 10 ms. hypodermically.

5. **Tinctura Ergotæ Ammoniata.**—1 in 4. **B.P. Dose.**—½ to 1 dr. (Ammonia exhausts ergot more efficiently. Kobert prefers an acid (HCl) exhaustive).

NON-OFFICIAL PREPARATIONS.

1. **Acid. Scleroticum.** *Syn.—Sclerotinic Acid.—Dose* ½ to ¾ gr. hypodermically.

2. **Cornutine** (*Kobert*).—Brownish-grey, amorphous. An efficient hæmostatic. *Dose.*—⅙ to ¼ gr. daily in divided doses. The **hydrochloride** and the **citrate** salts are more soluble.

3. **Ergotinina.** *Syn.—Ergotinine.*—An alkaloid in minute white crystals, insoluble in water, but soluble in alcohol and chloroform. *Dose.*—$\frac{1}{200}$ to $\frac{1}{40}$ gr. **Hypodermic injection.**—Ergotinine 1 gr., Lactic Acid 2 ms., Chloroform Water 1,000 ms. *Dose.*—5 to 10 ms.

4. **Liq. Ergot. Ammon.**—1 in 1. An efficient and reliable preparation. *Dose.*—10 to 60 ms.

PHARMACOLOGY.

Internally. **Gastro-intestinal canal.**—Ergot has a disagreeable bitter taste and increases **salivary secretion.** In moderate doses it stimulates the involuntary muscles of the intestine, sometimes so strongly as to cause looseness. In large doses it is a **gastro-intestinal irritant.**

Blood.—Its active principles readily enter the blood, but do not seem to affect its constitution.

Heart.—Ergot **depresses the cardiac muscle** and therefore slows the rate of the pulse. This slowing is due to the stimulation of the vagal terminal ends, since this does not occur if atropine is given before the administration of ergot. Consequently the **blood-pressure falls** at first.

Blood-vessels.—Very soon the **blood-pressure rises** from the **powerful contraction of the arterioles** all over the body, owing largely to its direct action on the involuntary muscular fibre in the arteries, and partly to the stimulation of the vaso-motor centres in the cord. Even the veins to some extent participate in this contraction. On account of the general vascular contraction together with the thickening of their walls produced by the sphacelinic acid, the coagulation of blood from a ruptured blood-vessel is greatly promoted ; and ergot therefore acts as a powerful **general hæmostatic** If this action continues long, **gangrene** may set in different parts of the body, leading to "**gangrenous ergotism.**" (see p. 382) Toxic doses paralyse the vaso-motor centres and the cardiac muscle, thereby producing a fall of the **blood-pressure.**

Respiration.—Ergot slows respiration. Death occurs from asphyxia caused by the spasm and weakness of the respiratory muscles.

Nervous system.—It has little effect on the brain. The highest centres are not affected by medicinal doses, nor even by a single large dose. It produces changes of a sclerotic nature especially in the postero-external columns of the cord, and induces a train of symptoms when it is given for a long time, which are known as "nervous ergotism."

Uterus.—Ergot powerfully contracts the impregnated uterus of women and of lower animals, especially when in labor, thereby expelling its contents. Hence it is a powerfull **ecbolic**. But the contractions are more frequent, more prolonged and irregular. In large doses it causes tetanic spasms. It is doubtful whether it acts at all as an **abortefacient**, since it cannot cause contraction of the uterus unless labor has once commenced. Upon the unimpregnated uterus, it has little or no action. This action is probably due to the direct stimulation of the unstriped muscle of the womb, and partly to the stimulation of the uterine centre in the cord.

Secretion.—The secretions of saliva, sweat, milk and urine are diminished, probably from the disturbance of the local blood supply to the glands by the general vascular contraction.

Chronic toxic action or Ergotism.—Poisoning by ergot rarely occurs when used medicinally, but it is very frequently seen amongst the poor, who live on diseased rye. They suffer either from (1) the disease of the blood vessel or from (2) the disease of the nerves, as detailed below :—

1. **Gangrenous Ergotism.**—Various parts of the body especially the extremities suffer from imperfect blood-supply, owing to the contraction and the thickening of the walls of the blood vessels, (see p. 381) thereby leading to a process of gangrene. It should not be mistaken for **pellegra**, a disease characterised by indolent ulcers on the skin, brought on by the use of diseased maize.

2. **Nervous Ergotism.**—In this variety, the patient first feels a sensation of itching, of tingling, and of insects crawling over the body, followed by a sensation of **numbness** and of **local anæsthesia.** These symptoms appear first in the hands and feet, then spread over the body. The sensory impairment is soon followed by the primary motor irritation, causing **tonic contraction** of the muscles especially of the extremities ; and then by their depression a **staggering gait.** Vomiting and diarrhœa often accompany this variety, and dimness of sight, loss of hearing and epileptiform convulsions are occasionally present.

It should not be confounded with *lathyrism*, palsy of the lower extremities caused by the use of chick-pea (*Lathyrus sativus* and *Lathyrus cicera*) as the only article of food.

THERAPEUTICS.

Externally.—A hypodermic injection of ergotin has sometimes been found useful in curing **goitres** and **aneurisms** when injected into the parts around the sac. Ergotin 3 grs. injected every two or three days into the sphincter or the prolapsed gut is said to cure **prolapse** of the **rectum.**

Internally.—As a *general hæmostatic* it has not entirely lost its reputation and is still largely used in internal hæmorrhages such as **epistaxis, hæmoptysis, hæmatemesis, hæmaturia,** &c. In urgent cases ergotin should be deeply or subcutaneously injected every fifteen to thirty minutes. It is the most valuable remedy we have in **post-partum hæmorrhage.** In multipara who are often subject to this sort of bleeding, it is a wise plan to administer ergot just after the birth of the fœtus, or even before its birth if there be no contra-indication to its adminstration. In desperate cases the ammoniated tincture or the liquid extract may be given in 1 or 2 drs., or the official hypodermic injection in 10 ms. doses very frequently. Good results have also been seen in **menorrhagia** and in **bleeding** from various forms of **uterine fibroids.** In fibroids ergotin should be injected into the lip of the os.

On account of its *constringent effect* on the vessels, ergot has occasionally been employed in **purpura, dysentery, enlargement** of the **spleen, spinal sclerosis, excessive sweating, diabetes insipidus,** &c.

It is said to be useful in **chronic obstinate constipation** when conbined with other purgatives. It acts probably by stimulating the intestinal peristalsis.

As an *ecbolic* ergot should be given with great caution. Its use should be confined to those *cases of uterine inertia in which there is no mechanical obstruction to the passage of the child;* otherwise it would endanger the child's life by prolonged tonic contraction of the uterus, or if the resistence is too much, it may cause its rupture. Hence Ergot should not be given *until after the expulsion of the placenta*, when it ensures firm contraction of the uterus and prevents post-partum hæmorrhage.

Prescribing hints.—Ergot is not a powerful poison. An ounce of the liquid extract has been given in one dose without toxic effects. The fresh infusion and the ammoniated preparations are to be relied upon. The unpleasant taste of ergot is best covered by chloroform water, and tincture of orange. The inky mixture which results when the liquid extract is ordered with perchloride of iron can be clarified by the addition of a little citric acid. Ergotin may be given in pill (see p. 88) or capsule. The deep muscles of the buttock should be selected for hypodermic injection, but not the abdominal wall. The subcutaneous injection is often followed by inflammation and abscesses. It is a good plan to give a dose of ergot to a recently-delivered female before the obstetric physician leaves the lying-in room. It deserves notice that ergot produces hourglass contraction of the uterus sometimes ending in retained placenta. Unless a female is previously predisposed ergot scarcely causes abortion. The writer has seen many pregnant women take ounces of liquid extract without any sign of uterine contraction.

EUCALYPTI GUMMI. Eucalyptus Gum. N.O. *Myrtaceæ.*

Habitat.—Australia. Cultivated in India on the Nilgiris.

Source.—A ruby-colored exudation, or so called Red Gum, from the bark of *Eucalyptus rostrata* and some other species of *eucalyptus.*

Characters.—In grains or small masses. Thin fragments are transparent ruby-red. Tough. Taste astringent. When chewed adheres to the teeth and tinges saliva red. *Solubility.*—80 to 90 p.c. in cold water, entirely in alcohol 90 p.c. *Impurity.*—Australian kino.

Identification.—It resembles kino, which is darker and feebly soluble in water.

Composition.—(1) *Kinotannic acid.* (2) *Catechin.* (3) *Pyrocatechin.*

Action.—A powerful astringent. **B.P. Dose.**— 2 to 5 grs.

OFFICIAL PREPARATION.

1. **Trochiscus Eucalypti Gummi.**—1 gr. in each.

NON-OFFICIAL PREPARATIONS.

1. **Decoc. Eucalyp. Gummi.**—1 in 40. Boil till dissolved. As a gargle, and in diarrhœa. *Dose.*—2 to 4 drs.
2. **Ext. Eucalyp. Gum. Liq. B.P.C.**—Gum 5 ozs., Alcohol 90 p.c. 2 ozs., water *q.s.* to 1 pint. *Dose.*—½ to 1 dr.
3. **Syr. Eucalyp. Gummi.**—Liquid extract 20, sugar 12, dissolve. *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—On account of the tannic acid it contains, eucalyptus gum is a true **astringent** like kino or catechu, but it is more powerful as it adheres with pertinacity to the mucous membrane. Its decoction, tincture or liquid extract (1 in 7) may be used as a gargle in **spongy gums** and **relaxed sore-throat,** or as a collunarium in **epistaxis.** The liquid extract mixed with water (1 in 10) makes a valuable lotion for injection into the vagina or rectum in **leucorrhœa** and **prolapse** of the **rectum.** Its suppository (5 grs. in each) may be used in **piles.**

EUCALYPTI OLEUM. Oil of Eucalyptus.

Source.—The oil distilled from the fresh leaves of *Eucalyptus globulus* and other species of *Eucalyptus.*

Characters.—Colorless or pale-yellow. Odor aromatic camphoraceous. Taste pungent, leaving a sensation of coldness in the mouth. Sp. gr. 0·910 to 0·930. *Solubility.*—3 in 1 of alcohol 90 p.c.

Composition.—(1) *Eucalyptol,* a volatile oil 70 p.c., being a mixture of (*a*) a *terpene* called *phellandrene,* (*b*) *cymene.* (2) A *Resin* (crystallisable) yielding ozone. (3) An *Oil, cineol,* isomeric with cajuputene hydrate. (4) *Tannin.*

Incompatibles.—Alkalis, mineral acids, metallic salts.

Action.—Powerfully antiseptic, deodorizer, antipyretic. **B.P. Dose.**—½ to 3 ms.

OFFICIAL PREPARATION.

1. **Unguentum Eucalypti**.—1 in 10.

NON-OFFICIAL PREPARATIONS.

1. **Eucalyptus Dressings**.—**Gauze** 6 p.c. **Wool** and **Lint** 10 p.c.
2. **Eucalypteol**. *Syn.—Eucalyptene hydrochloride.*—Crystalline, white, bitter, insoluble in water. In phthisis and diarrhœa. *Dose.*—2 to 6 grs.
3. **Eucalyptol**. *Syn.—Cineol.*—Is that portion of the oil which passes over between 347° and 351°. It does not dry up like a varnished coating. Useful in phthisis, asthma, diarrhœa. *Dose.*—1 to 4 ms.
4. **Tr. Eucalypti. B P.C.**—Leaves of *E. Globulus* 4 ozs., Alcohol 90 p.c. *q.s.* Percolate to 1 pint. *Dose.*—15 to 120 ms.

PHARMACOLOGY.

Externally.—Oil of eucalyptus is a **powerful antiseptic** and **disinfectant**. The old oil is more antiseptic than the new because it is more ozonised. Rubbed into the skin it is less irritant than other volatile oils, but if its evaporation is stopped it causes **rubefaction** and **vesication**. It is destructive to low organisms.

Internally. **Gastro-intestinal canal**.—In small doses it increases the **salivary** and **gastric secretions**, and thus acts as a **stomachic**. In large doses it produces gastro-intestinal irritation, with symptoms of vomiting, diarrhœa and colic.

Circulation.—Like quinine it stops the **migratory movements of white blood corpuscles** and contracts the **engorged spleen**. It posesses also **mild antiperiodic** and **antipyretic** properties. In small doses it stimulates the heart and raises the blood-pressure, perhaps reflexly from the stomach ; and in excessively large doses the heart becomes weak and the blood-pressure and temperature fall.

Respiration is slightly stimulated by small doses, and is slowed by large ones. Death occurs from respiratory paralysis.

Nervous system.—Large doses depress the action of the brain, the medulla and the cord, thereby paralysing the reflex action.

Elimination.—Like most of the volatile oils, it is excreted by the kidneys, the skin, and the respiratory and the genito-urinary mucous membranes, stimulating their actions during its passages through. Hence it is a **diuretic**, a **diaphoretic**, a stimulating **expectorant**, and a disinfecting stimulant to the genito-urinary tract. It imparts its smell to, and disinfects, breath. Like oil of turpentine it causes renal congestion, and disinfects and imparts, a violet odor to the urine.

THERAPEUTICS.

Externally.—Oil of eucalyptus, though a valuable antiseptic cannot be freely used on account of its local irritant property and cost. However, its ointment may be used in **foul ulcers** and **wounds.** Its gauze, lint and wool are often used as antiseptic surgical dressings. Made into a pessary (15 ms. of oil in 1 dr. of cocoa butter and 1 dr. of white wax), it has been found serviceable in **cancer** of the **uterus** and **rectum** and in checking fœtor and decomposition of the lochia ; and into a bougie with iodoform (see iodoform), in **urethral chancre** and **gonorrhœa.** An ointment of oil of eucalyptus 8, iodoform 1, hard paraffin 27, and soft paraffin 6, is considered a valuable remedy in **chancres.** Alone or mixed with mustard oil or olive oil, it may be rubbed into the skin in **chronic rheumatism** and **myalgia.** Its vapor has been used as an inhalation in **pulmonary gangrene, phthisis, chronic** or **foul bronchitis, ozœna,** &c. Many physicians now treat patients suffering from **exanthemata, whooping cough** and **diphtheria** by enveloping them in an atmosphere of eucalyptus vapor. In **influenza** this plan of treatment is popularly adopted. Its inunction is also recommended in **scarlet fever.** It may be used as a **parasiticide.**

Internally.—To correct the **fœtor of expectoration,** or to cut short an attack of **coryza,** of **influenza,** and of **catarrh,** it may be used with benefit. In septic fevers, such as **pyæmia, septicæmia, puerperal fever,** it has been found very efficacious in 5 ms. doses. It may arrest **ague** and reduce **enlarged spleen,** but it is far inferior to quinine. As a stomachic carminative it has occasionally been prescribed in **dyspepsia,** especially if the stools are foul-smelling. A rectal injection of eucalyptol is considered to be an effective remedy in **threadworm.** Oil of eucalyptus is a popular prophylactic against **influenza.**

Prescribing hints.—Oil is best given on sugar or mixed with honey, or as an emulsion with mucilage of acacia and glycerin. This emulsion may also be used as an urethral injection. Mixed with good English honey it is sold in the Calcutta market as "Eucalyptus Honey" for colds and coughs of children.

EUONYMI CORTEX. Euonymus Bark. N. O. *Celastrineæ.*

Syn.—Wahoo, Spindle-tree and Hominy bush bark.

Habitat.—United States.

Source.—The dried root-bark of *Euonymus atropurpureus.*

Characters.—In quilled or curved pieces ; $\frac{1}{12}$ to $\frac{1}{6}$ in. thick ; outer layer ash-grey marked with darker patches ; inner surface pale tawny white, smooth when free from fragments of the white wood. Odor faint, characteristic. Taste mucilaginous first, then bitter, acrid.

Composition.—(1) *Euonymin,* a resin. (2) *Asparagin.* (3) *Euonic acid.*

OFFICIAL PREPARATION.

1. **Extractum Euonymi Siccum.** *Syn.—Euonymin.*—**B.P. Dose.**—1 to 2 grs. in pill. (Should be kept in well-stoppered bottle).

NON-OFFICIAL PREPARATION.

1. **Tr. Euonymi. B.P.C.**—Bark 4, Alcohol 90 p.c., q.s. to 20. Percolate. *Dose.*—10 to 40 ms.

PHARMACOLOGY AND THERAPEUTICS.

The action of euonymin resembles in many respects that of podophyllum, but is milder. In very small doses it stimulates the secretion of the gastric juice, and in large doses it irritates the intestine. In medicinal doses it **increases** the **amount** of **bile** and **solids** secreted into the bowels. Hence it is a **cholagogue laxative.** It is said to have slight expectorant and diuretic properties. It is a very useful remedy in **hepatic disorders**, and in **constipation**, especially when it is due to the torpidity of the liver. With cascara it may be given in **chronic** or **habitual constipation** with very good results.

Prescribing hints.—Euonymin may be given in pill or powder. The former is best massed with soap ($\frac{1}{6}$ gr. for a 2 or 3 gr. pill) if given alone. It is often prescribed with other cholagogues and laxatives as in the following formula—Euonymin $1\frac{1}{2}$ grs., Podophyllin $\frac{1}{4}$ gr., Pulv. Ipecac. $\frac{1}{4}$ gr., Pil. Colocynth et Hyos. $2\frac{1}{2}$ grs., Ext. Nucis Vom. $\frac{1}{6}$ gr. M.Ft. Pil. Mitte talis. 24. One pill at bed time in obstinate constipation. The following powder is often prescribed by the writer with encouraging results in infantile hepatic enlargement with slow fever.—Ext. Euonymin Sic. $\frac{1}{2}$ gr., Pulv. Ipecac. $\frac{1}{6}$ gr., Pulv. Rhei 2 grs., Salicinum 1 gr., Sod. Bicarb. 2 grs. M.Ft. Pulv. Mitte talis 24, twice or thrice daily.

FEL BOVINUM PURIFICATUM. Purified Ox Bile.

N. O. *Ruminantia.*

Source.—Obtained by evaporating fresh ox bile to one quarter of its volume, shaking it with alcohol 90 p.c., filtering and evaporating the residue to the consistence of a thick extract.

Characters.—Yellowish-green, hygroscopic. Taste partly sweet partly bitter. *Solubility.*—In water, alcohol 90 p.c.

Action.—Antiseptic, purgative. **B.P. Dose.**—5 to 15 grs. in pill.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Ox bile helps the emulsification of fats, and is a **cholagogue purgative.** It may therefore be used in those cases of **dyspepsia** and **constipation**, in which the natural secretion of bile is very deficient. 20 to 30 grs. dissolved in 1 or 2 ozs. of water may be given as a clyster in cases of **impacted rectum,** where there is no room for a larger enema.

It is generally given in cachets or in solution, but it should be administered in keratin coated or salol varnished pills two hours after food.

FERRUM. Iron. Fe.

Syn. I.V.—*Lohá*, Beng., Hind. *Louha*, Sans.

Source.—Annealed iron wire having a diameter of about 0·005 inch, or wrought iron nails free from oxide.

Iron salts naturally group themselves into 2 classes,—Ferrous or Protosalts based upon oxide FeO, and Ferric or Persalts (sesquisalts) upon oxide Fe_2O_3. Ferrous salts soon become ferric from the absorption of atmospheric oxygen, especially in the presence of oxidising agents, as chlorine, nitric acid, &c.

OFFICIAL PREPARATION.

1. **Vinum Ferri.**—1 oz to 1 pint. Contains tartrates, citrates and malates of iron. 3 fl. drs. are equal to 5 ms. of Tr. Ferri Perchlorid. A mild hæmatinic tonic, may be given with cod-liver oil to children. **B.P. Dose.**—1 to 4 drs.

NON-OFFICIAL PREPARATION.

1. **Mistura Ferri aromatica. B.P. 1885.** *Syn.—Heberden's Ink.*—Red Cinchona bark 1 oz., Calumba ½ oz. Cloves ¼ oz., Iron wire ½ oz., Tr. Card. Co. 3 ozs., Tr. Aurantii ½ oz., and Aqua Menth. pip. to 16 ozs. Macerate. An example of authorized chemical incompatibility. A stomachic tonic and hæmatinic. *Dose.*—1 to 2 drs.

FERRUM REDACTUM. Reduced Iron. Fe and Fe_3O_4.

Source.—A fine powder containing 75 p.c. of metallic iron, with a variable amount of iron oxide ; prepared by reducing ferric hydroxide, heated to redness, by a stream of dry hydrogen.

Characters.—A greyish-black powder attracted by magnet. *Impurity.*—Sulphur.

Action.—A non-astringent, hæmatinic, tonic. **B.P. Dose.**—1 to 5 grs. in pill, powder or lozenge.

OFFICIAL PREPARATION.

1. **Trochiscus Ferri Redacti.**—1 gr. in each. *Dose.*—1 to 6.

FERRUM TARTARATUM. Tartarated Iron.

Source.—Prepared like Ferri et Ammon. Citras with Acid Pot. Tartrate instead of citric acid.

Characters.—In thin, transparent, garnet scales. Taste somewhat sweetish, astringent. *Solubility.*—1 in 1 of water. *Impurities.*—Ferrous salts, ammonia.

Identification.—Its scales are smaller than those of Ferri et Ammon. Citras, being lighter in color and not so sweet.

Action.—Hæmatinic, tonic, diuretic. **B.P. Dose.**—5 to 10 grs. in mixture.

FERRI ARSENAS. Iron Arsenate.

It consists of ferrous and ferric arsenates with some iron oxide.

Source—Prepared by mixing hot solutions of sodium arsenate and ferrous sulphate, adding sodium bicarbonate in solution, and washing and drying the precipitate. $3FeSO_4 + 2Na_2HAsO_4 + 2NaHCO_3 = Fe_3(AsO_4)_2 + 3Na_2SO_4 + 2H_2O + 2CO_2$.

Characters.—A tasteless (not to be tasted), greenish, amorphous powder; insoluble in water. *Impurities.*—Sulphates, &c.

Antidotes.—The same as those of Acidum Arseniosum (see p. 175.)

Action.—Like arsenic. Useful in skin and liver diseases with gouty, rheumatic or malarial taint, also in chronic malarial fevers. **B.P. Dose.**—$\frac{1}{16}$ to $\frac{1}{4}$ gr. in pill.

FERRI CARBONAS SACCHARATUS.

Saccharated Iron Carbonate.

A ferrous oxycarbonate, $xFeCO_3$, $yFe(OH)_2$, more or less oxidised, mixed with sugar; the ferrous salt if reckoned as carbonate, $FeCO_3$, forming about $\frac{1}{3}$ of the mixture.

Source.—Prepared by precipitating fresh iron carbonate by mixing solutions of ammonium carbonate and ferrous sulphate; and washing and rubbing it with sugar. Sugar presents further oxidation.

Characters.—A greyish-brown, lumpy powder with a sweet chalybeate taste. *Impurities.*—Sulphates, excess of iron oxide.

Identification.—The greyish-brown color, the lumpy nature, the sweet chalybeate taste and the absence of odor help recognition.

Incompatibles.—Vegetable astringents, acids and acidulous salts.

Action.—An easily borne non-astringent chalybeate. **B.P. Dose.**—10 to 30 grs. in cachets, powders, lozenges or pills.

OFFICIAL PREPARATIONS.

1. **Mistura Ferri Composita.** *Syn.—Griffith's Mixture* (modified).—2½ grs. in 1 oz. A valuable preparation for amenorrhœa from anæmia. **B P. Dose.**—½ to 1 oz.

Dispensing Hints.—The mixture may be prepared and kept without iron sulphate which (2½ grs. per ounce) may be added when dispensed.

NON-OFFICIAL PREPARATIONS.

1. **Pilula Ferri Carbonatis.** *Syn.—Vallet's Mass.*—A freshly precipitated iron carbonate made into a pill with honey and sugar.
2. **Troch. Ferri Carb. Sacch.**—3 grs. in each. Largely used nowadays. *Dose.*—1 to 3.

FERRI ET AMMONII CITRAS.

Iron and Ammonium Citrate.

Source.—Prepared by mixing the diluted solutions of ammonia and ferric sulphate, dissolving the product ferric hydroxide in hot solution of citric acid, neutralizing the product with ammonia, evaporating and drying in thin layers on glass sheets.

Characters.—In deep red, transparent, thin scales. Taste slightly astringent. *Solubility.*—2 in 1 of water. *Impurities.*—Tartrates, sulphates.

Identification.—It resembles Ferrum Tartaratum, but is darker, less shining, sweeter and is found in larger scales.

Incompatibles.—Mineral acids, fixed alkalis and vegetable astringents

Action.—An almost non-astringent chalybeate, easily borne by the stomach when given in an effervescing form ; the iron salt being put in the acid solution. **B.P. Dose.**—5 to 10 grs.

Official Preparation.

1. **Vinum Ferri Citratis.**—8 grs. in 1 oz. **B.P. Dose.**—1 to 4 drs.

FERRI ET QUININÆ CITRAS. Iron and Quinine Citrate.

Source.—Prepared like Ferri et Ammon. Citras, freshly precipitated quinine being also dissolved in the solution of citric acid.

Characters.—In greenish golden-yellow somewhat deliquescent thin scales. Taste bitter. *Solubility.*—2 in 1 of water. *Impurities.*—Alkaline salts and other alkaloids instead of quinine.

Identification.—The golden-yellow color, the bitter taste and the deliquescent nature distinguish it from other scale preparations. Note the characteristics of the three scale compounds.

Incompatibles.—Alkalis and their carbonates, tannin, vegetable astringents, potassuim citrate.

Action.—Hæmatinic, tonic, antiperiodic. **B.P. Dose.**—5 to 10 grs. in pill or mixture.

FERRI PHOSPHAS. Iron Phosphate.

A powder containing not less than 47 per cent of hydrous ferrous phosphate $Fe_3(PO_4)_2 8H_2O$, with ferric phosphate and some iron oxide.

Source.—Prepared like Ferri Arsenas by substituting soduim phosphate for sodium arsenate (see p. 389).

Characters.—A slate blue amorphous powder, insoluble in water. *Impurity.*—Arsenic.

Action.—A nervine tonic. **B.P. Dose.**—5 to 10 grs. in cachets, pills or powders.

Official Preparations.

1. **Syrupus Ferri Phosphatis.**—1 gr. of anhydrous ferrous phosphate in 1 dr **B.P. Dose.**—½ to 1 dr.

Dispensing hints.—This may be conveniently made by mixing Liq. Ferri Phosph Fort. 1, Simple Syrup 5½, distilled water 1½. A small excess of the solution is necessary to prevent the loss from oxidation. The syrup is to be kept in small bottles lying down.

2. **Syrupus Ferri Phosphatis cum Quinina et Strychnina.** *Syn.—Easton's Syrup* (modified).—1 gr. anhydrous ferrous phosphate,

⅘ gr. Quinine sulphate, $\frac{1}{32}$ gr. Strychnine, in 1 fl. dr. An excellent general and nervine tonic. **B.P. Dose.**—½ to 1 dr. (It becomes discolored).

Dispensing hints.—This syrup may be made on the counter thus:—Strychnine 10 grs., Quinine sulphate 260 grs., concentrated Phosphoric acid 2 drs., Distilled water *q.s.* to 5 ozs. Mix and keep ready. When required 1 part to 7 parts of Syrup Ferri Phosphatis.

NON-OFFICIAL PREPARATIONS.

1. **Liquor Ferri Phosphatis Fortis.**—8 grs. in 1 dr. Iron wire 360 grs., concentrated Phosphoric acid 6 ozs. Distilled water *q.s.* to 12 ozs. Dissolve.

2. **Pilula Ferri Quininæ et Strychninæ Phosphatum.** *Syn.—Easton's Pill.*—An equivalent for **Easton's Syrup.** Ferrous Phosphate 16 grs., Quinine Sulphate 16 grs., Strychnine ½ gr., Milk Sugar 20 grs., Concentrated Phosphoric Acid *q.s.* 83. Mix quickly, first having triturated strychnine with milk sugar and divide into 16 pills.

3. **Syrupus Ferri et Manganesii Phosphatum.**—Prepared by dissolving manganese phosphate ½ gr. in 1 dr. of official Syrup. Ferri Phosphatis.

4. **Syrupus Ferri Phosphatis Compositus. B.P.C.** *Syn.—Chemical Food, Parrish's Syrup* (modified).—Iron Phosphate ½ gr., Calcium Phosphate ⅘ gr. in 1 dr. Iron wire free from oxide 37½ grs., Concentrated Phosphoric Acid (Sp. gr. 1.5) 1 oz., Distilled water 5 drs., put all in a flask plugged with cotton and dissolve by gentle heat, iron being under the liquid. Add this to the following when the latter has cooled:—

Precipitated Calcium Carbonate 120 grs., Concentrated Phosphoric Acid 4 drs., Distilled water 2 ozs.; mix and add Potassium Bicarbonate 9 grs., Sodium Phosphate 9 grs., filter and set aside.

Cochineal 30 grs., Distilled water 7½ ozs., boil for 15 minutes and filter, pouring over the filter water *q.s.* to make 7 fl. ozs. of filtrate; to this add refined sugar 14 ozs. and heat till dissolved and strain. When cold add the former filtrate set aside, and distilled water *q.s.* to 20 ozs. It should be kept in bottles quite full. *Dose.*—½ to 2 drs.

FERRI SULPHAS. Ferrous Sulphate. $FeSO_4, 7H_2O$.

Syn. I.V.—*Hirekas.* Beng.

Source.—Prepared by the interaction of diluted sulphuric acid and iron.

Characters.—In oblique, rhombic prisms, of a pale greenish-blue color and astringent taste. *Solubility.*—1 in 1½ of water. *Impurities.*—Persalts and other metals.

Identification.—Easy, as no other salt of B.P. resembles it. When exposed it effloresces. The crust being reddish-brown.

Action.—Astringent, hæmatinic tonic and emmenagogue. An adjunct to purgatives. Externally astringent and styptic. Its lotion (10 grs. to 1 oz.) is very useful in erysipelas. **B.P. Dose.**—1 to 5 grs. in pill (see p. 88).

OFFICIAL PREPARATIONS,

1. **Ferri Sulphas Exsiccatus.**—2½ grs. equal to 4 grs. Ferri Sulphas. A nearly white powder made by heating Ferri Sulph. at 212° till it

loses 40 p.c. of its weight; and powdering it fine. *Enters into.*—Pil. Aloes et Ferri. **B.P. Dose.**—½ to 3 grs, in pill (see p. 88).

2. **Liquor Ferri Persulphatis.**—36½ p.c. Prepared by dissolving 8 ozs. of ferrous sulphate in 6 drs. of Sulphuric acid diluted with 10 ozs. of water, and adding the same to nitric acid diluted with 2 ozs. of water, and making up 11 ozs., after converting the sulphate into persulphate by boiling. **Action.**—Styptic. *Enters into*—The preparation of Ferri et Ammonii Citras, Ferri et Quinin. Citras, Ferrum Tartaratum and Liq. Ferri Acetatis.

3. **Pilula Ferri.** *Syn.—Blaud's Pill.*—1 Ferrous carbonate in 5. Ferri sulph. changes into carbonate. Both ferrous sulphate and sodium carbonate should be perfectly dry. An excellent hæmatinic tonic and emmenagogue, generally used in amenorrhœa. **B.P. Dose.**—5 to 15 grs.

4. **Pilula Aloes et Ferri.**—1 in 9. **B.P. Dose.**—4 to 8 grs.

NON-OFFICIAL PREPARATION.

1. **Liquor Ferri Sub-sulphatis. U.S.—Syn.**—Monsel's Solution.—Strong styptic and least irritating. *Dose.*—3 to 6 ms.

LIQUOR FERRI ACETATIS. Solution of Ferric Acetate.

Source and Characters.—A sour, red liquid prepared by dissolving ferric hydrate formed by precipitating solution of ferric sulphate with ammonia, in glacial acetic acid and water.

Action.—Hæmatinic, astringent, diuretic. Can be given with Potassium acetate in Bright's disease. **B.P. Dose.**—5 to 15 ms. in mixture.

NON-OFFICIAL PREPARATION.

1. **Mist. Ferri et Ammon. Acetatis.** *Syn.—Basham's mixture.*—Tr. Ferri Perchlorid. 2 drs., Acid Acetic dil. 3 drs., Liq. Ammon. Acetatis 2½ ozs., Elix. Aurantii 10 drs., Syrup 15 drs. Water 6 ozs. 2 drs. Mix the solution of acetate of ammonia with acid, add tincture, then the rest, and mix. *Dose.*—1 to 4 drs.

LIQUOR FERRI PERCHLORIDI FORTIS.

Strong solution of Ferric Chloride.

Source.—Prepared by boiling iron wire in hydrochloric acid and water, and after filtering, adding nitric acid and more hydrochloric acid, and evaporating.

Characters.—An orange-brown solution, miscible with water and alcohol. *Impurities.*—Ferrous Salts and other metals. 110 ms. contain 22½ grs. of iron.

Action.—Caustic, hæmostatic, powerful astringent.

OFFICIAL PREPARATIONS.

1. **Liquor Ferri Perchloridi.**—1 in 4. **B.P. Dose.**—5 to 15 ms. diluted freely.

2. **Tinctura Ferri Perchloridi.** *Syn.—Steel Drops.*—1 in 4. **B.P. Dose.**—5 to 15 ms. diluted freely.

NON-OFFICIAL PREPARATIONS.

1. **Liquor Ferri Chloroxydi.**—A non-irritant and non-astringent hæmatinic. *Dose.*—10 to 30 ms.

2. **Liquor Ferri Dialysatus. B.P. 1885.**—Contains 5 p.c. of ferric oxide. A useful antidote to arsenic. A non-irritating tasteless hæmatinic, largely prescribed. *Dose.*—10 to 30 ms. It is in reality a colloid or undialysed iron, which does not pass through the septum ; hence doubts are entertained as to its assimilation. But this is a fact that patients improve under its use.

LIQUOR FERRI PERNITRATIS. Solution of Ferric Nitrate.

Source and Characters.—An acid reddish-brown liquid, prepared by dissolving iron wire in nitric acid and water. 110 ms. contain $3\frac{1}{3}$ grs. of iron. *Impurities.*—Ferrous salts, chlorides and sulphates. **B.P. Dose.**—5 to 15 ms.

SYRUPUS FERRI IODIDI. Syrup of Ferrous Iodide. 1 gr. in 11 ms.

This is liable to discoloration either from the oxidation of iron, which may be removed by careful manipulation or by hypophosphorous acid ; or from slight caramelisation of sugar by over heating. Very useful in syphilis and scrofula. **B.P. Dose.**—½ to 1 dr., 2 ms. for a child one year old.

NON-OFFICIAL PREPARATIONS OF IODIDE OF IRON.

1. **Liq. Ferri Iodidi.**—Prepared by combining iron wire 1 oz., iodine 2 ozs., in water 2 ozs., by gentle heat until whole of iodine is combined. Decant and add concentrated hypophosphorous acid 1 dr., filter and add water to 4 ozs. 1 vol. to 7 vol. of steek syrup makes Syrupus Ferri Iodidi, B.P. It keeps well in a corked bottle with a small quantity of hypophosphorous acid, or a coil of bright iron wire immersed in it.

2. **Pilula Ferri Iodidi. B.P. 1885**—*Dose.*—3 to 8 grs.

ADDITIONAL NON-OFFICIAL PREPARATIONS AND DERIVATIVES OF IRON.

1. **Ferri Albuminas.**—A scale preparation fairly soluble in water, containing 5 p.c. of ferric oxide. Useful in anæmia and gastric ulcer. Striking results from the hypodermic injection of 10 to 20 ms. of aqueous solution. *Dose.*—5 to 15 grs.

2. **Ferratin.**—A tasteless brown powder prepared from egg albumen and Ferri et Sod. Tartras, containing iron 7 p.c. A most easily assimilable preparation known. *Dose.*—20 to 30 grs.

3. **Ferri Lactas.**—A greenish soluble powder. *Dose.*—2 to 10 grs.

4. **Carniferrin.**—A compound of phospho-carnic acid of muscle and iron. A tasteless brown powder easily assimilated. *Dose.*—8 grs. daily.

5. **Ferro-Somatose.**—A tasteless soluble brown powder containing albumose of meat (somatose) and ferric oxide 4·5 p.c. Easily assimilable in anæmia and chlorosis. *Dose.*—75 to 150 grs. daily. **Iron-tropon** is a similar compound with nutrient tropon. *Dose.*—1 dr. thrice daily.

6. **Ferri Succinas.**—Prepared by mixing ferri peroxid. hydrate 5, acid succinic 3, pot. citras 15, glycerin 15, water 120. Useful in biliary calculi, with chloroform. *Dose.*—1 dr. with chloroform 10 ms., 4 to 6 times daily after food.

7. **Ferri Bromidum.** *Dose.*—3 to 10 grs.

8. **Syrupus Ferri Bromidi. B.P.C.**—4½ grs. ferrous bromide in 1 dr. Prepared by agitating ironwire free from oxide ½ oz., with bromine 533 grs., and water 4 ozs., and filtering the solution into warm syrup made by mixing sugar 14 ozs., and water 6 ozs. *Dose.*—½ to 1 dr.

9. **Syrupus Ferri Bromidi cum Quinina. B.P.C.**—1 gr. of quin. acid hydrobrom. and 4 grs. of ferrous brom. in 1 dr. Prepared by dissolving quinin. acid hydrobrom. 160 grs. in water 13 drs., acid hydrobrom. dil. 3 drs., and adding syr. ferri brom. to 20 ozs. *Dose.*—½ to 1 dr.

10. **Syr. Ferri Brom. C. Quin. et Strych. B.P.C.**—$\frac{1}{64}$ gr. of strychnine, 1 gr. of quinine acid hydrobrom. 4 grs. of ferrous brom. in 1 dr. Prepared as above with the addition of strychnine 2½ grs. *Dose.*—½ to 1 dr. diluted.

11. **Ferri Hypophosphis.**—Freshly made salt is greenish, crystalline soluble in water, commercial salt is insoluble. *Dose.*—1 to 5 grs. in pill.

12. **Liquor Ferri Hypophosphitis Fortis. B.P.C.**—5 grs. of ferrous hypophos. in 1 dr. *Dose.*—10 to 30 ms.

13. **Liquor Hypophosphitum Compositus. B.P.C.**—*Syn.*—*Liquor Ferri Hypophosphitis Comp.*—2 grs. each of sodium and calcium hypophosphite, 1 gr. of magnesium hypophosphite, and 1½ grs. ferric hypophosphite in 1 dr. *Dose.*—½ to 2 drs.

14. **Syrup. Ferri Hypophos. B.P.C.**—1 gr. ferric hypophos. in 1 dr. Liq. Ferri Hypophos. Fortis 4 ozs., syrup 16 ozs. Mix. *Dose.*—½ to 2 drs.

15. **Syrupus Hypophosphitum Compositus. B.P.C.**—$\frac{1}{100}$ gr. of strychnine and ⅛ gr. of quinine hypophos. in 1 dr. Strychnine 1 gr., hypophosphorous acid 2 drs. Dissolve, and add it to the following solution.—Calcium hypophosphite 80 grs., manganese 40 grs., potassium 40 grs., quinine 20 grs., distilled water 8 ozs. Filter, then add successively strong solution of ferric hypophosphite 1 oz, sugar 14 ozs.; dissolve without heat, and add chloroform 20 ms., alcohol 90 p.c. 40 ms.; shake well and add lastly water *q.s.* to 1 pint. *Dose.*—½ to 2 drs. This is intended to be a substitute for **Fellow's Compound Syrup of the Hypophosphites.**

16. **Liquor Ferri Peptonati** (*Dieterich*).—A solution of peptonated iron. *Dose.*—1 to 4 drs.

17. **Ferri Fluoridum.**—A purplish-white insoluble powder. In enlarged spleen, or other enlarged glands. *Dose.*—$\frac{1}{20}$ to ½ gr.

Pharmacology of Iron and its Salts.

Externally.—Iron salts have no action on the unbroken skin, and are not absorbed by it. **Ferrous** and **organic salts** are **feebly astringent** or not at all, but **ferric salts** are **powerful astringents.** A solution of ferric salt when applied to a denuded surface, mucous membrane, sores or ulcers, **coagulates** the **albuminous secretion,** as well as the **albumen** of the tissues. It also coagulates **blood** and **plasma.** Thus, the circulation of the part is greatly reduced by the compression of the coagulated albumen from outside and not by the contraction of the muscular fibres of the walls of the blood-vessels. If there is any **hæmorrhage**, it is readily arrested by (1) the compression of the blood-vessels from without, and (2) the plugging of the bleeding vessels from hard clots of blood within them. Therefore it is a powerful **styptic**. The perchloride, the pernitrate and the sulphate of iron are all strong **local astringents**. The oxides of iron convert oxygen into ozone and are therefore **disinfectants**.

Internally. **Mouth.**—Iron **blackens** the **teeth** and the **tongue**, from the deposition of iron sulphide. The sulphur is derived from the food and tartar on the teeth. It has a styptic taste, and the ferric salts have a similar action here as on the raw skin.

Stomach.—All iron preparations, in whatever form they are taken by the mouth, are mostly **converted** into **ferric chloride** in the stomach, and not into an albuminate as has been generally supposed. Even an albuminate is decomposed into a chloride. If given in excess, or if the food or the gastric juice is deficient, they (except the ferric chloride) will abstract the hydrochloric acid from the gastric juice, and impair digestion. On the other hand, strong acid salts set free a lot of acid, after the formation of the ferric chloride which acts as an **irritant** to the mucous membrane. Even the preparations of perchloride do this as they contain a large amount of free acid. The astringent effect of iron salts depends no doubt upon the amount of ferric chloride formed in the stomach.

Intestines.—Here too the iron salts undergo decomposition. The ferric chloride coming in contact with the alkaline fluid becomes an oxide of iron, which remains dissolved in the intestinal fluid because of the presence of organic matters. The subchloride becomes the ferrous carbonate which is also soluble. Down below they are again converted into sulphides and tannates by the sulphuretted hydrogen and tannic acid, this being derived from the vegetable food, and are passed out with the fæces, which are colored black. Experience has shown that iron produces **constipation**, particularly if the astringent preparations are given; but it is not known whether this is due to its direct or remote action. It is also a clinical fact that it occasionally causes **diarrhœa**. Doubts are entertained as to whether the iron salts are absorbed by the intestines, but from the following it will be evident that they are.

Absorption.—There is a concensus of opinion that **organic compounds of iron** are absorbed by the gastro-intestinal canal, for the growing child derives all the iron necessary for its increasing growth and weight from its food. But opinions widely differ as to the absorption of inorganic compounds of iron. Indeed one class believe that inorganic preparations are not taken up by the gastro-intestinal tract. Buchheim's view is that inorganic compounds of iron are not absorbed but exert their beneficial effect in anæmia by a stimulating action on the gastro-intestinal mucous membrane, whereby appetite and digestion are improved, and the extra food taken supplies the necessary iron to reconstitute the blood.

Bunge's theory is somewhat similar. He holds that inorganic iron cannot be absorbed, and that only iron in organic combination, as found in food stuffs, can be utilised for the formation of hæmoglobin. He says that, in anæmia, digestion is greatly disturbed, and that alkaline sulphides are produced which combine with the organic iron in the food, producing Fe_2 S, which is an inorganic salt and therefore incapable of absorption He argues that when iron is given in this condition, it combines with, and neutralises, the alkaline sulphides, thus protecting the organic iron of the food stuffs and allowing it to be absorbed. The chief argument in support of these views is that when iron salts are given by the mouth they do not cause excretion of more iron in the urine or the bile. But it has been shown that the absence of iron from the urine and the bile is fully accounted for by its retention in the liver and subsequent excretion through the intestinal mucous membrane. Moreover it has been proved that mere stimulation of the intestinal mucous membrane by other tonics does not cure anæmia and Stockman has shown (*a*) that sulphide of iron, which cannot absorb alkaline sulphides, will cure chlorosis (*b*) that bismuth which can neutralise more sulphides than iron, is quite useless for this purpose. The views of Bunge and Buchheim may therefore be rejected and the modern view founded on histological evidence is that iron salts are **absorbed by the intestinal epithelium** and transferred to the white corpuscles of the blood, which convey them to the liver where they are deposited and gradually elaborated into more or less complex organic substances one of which is certainly Ferratin. These organic compounds then slowly pass into the several blood stream, and are utilised by the great blood-forming organs, viz., the spleen, the lymphatic glands and the red bone-marrow.

Blood.—In health iron has very little effect upon either the quantity or the quality of the blood corpuscles, but in some forms of anæmia, both the number of corpuscles and their hæmoglobin value are markedly increased. In cases of this kind it is probable that iron acts in the following way—(1) The functional activity of the blood-forming organs, which is lowered or suppressed in anæmia, requires a stimulus or impulse. (2) Iron, when carried in the circulation to these organs, acts as a *chemical stimulus* and not being an entirely foreign constituent is less injurious in its action than other stimulants. Hence iron is a splendid **hæmatinic.** As the quantity of iron in the blood of an ordinary healthy female is about 38 grains, we could, if the absorption of iron was great, cure chlorosis in one day's treatment; but such is not the case. The absorption is too slow and the process by which it is elaborated is too complex.

Metabolism.—With the improvement of the red blood corpuscles in anæmia, there is necessarily an increased absorption of oxygen, and an increased oxidation of tissues. Hence, the functional activity of all the organs of the body is stimulated, leading to the general improvement and the tone of the body. Iron is therefore a most valuable **general tonic**. As the whole system shares in this benefit, the menstrual flow, if it had been stopped, is re-established, and many disordered functions are rectified.

Kidneys and bladder.—Iron salts are feebly excreted by the renal cells. One milligramme is eliminated daily and this seems to remain almost constant in all circumstances. The ferric salts slightly diminish the secretion of urine, while the other preparations have no effect, except the tartrate and the acetate, which slightly increase it. They may sometimes **irritate the bladder**, and may cause **nocturnal incontinence** of urine in children.

Elimination.—Opinions vary. Some say that iron is excreted in the urine, sweat, saliva, milk, bile and pancreatic juice, and by the intestinal mucous membrane; while others, in the urine and bile only. However, this is a fact that much is eliminated by the gastro-intestinal mucous membrane, as the amount in the urine and the bile is almost constant. A small portion of it is stored up in the spleen, the marrow and the lymphatic glands, but the most goes to the liver, where it is used up in forming complex compounds (one of which is ferratin), as the precursors of hæmoglobin. The red marrow also has a share in the production of red blood-corpuscles.

Therapeutics of Iron and its Salts.

Externally.—Organic iron salts and ferrous salts except ferrous sulphate are not locally used. The strong solution of ferric chloride may be used as a caustic to destroy **polypus** of the nose, **warts**, &c. Its solution (1 in 4) or the Liq. Ferri Perchloridi may be used as a local hæmostatic in **leech-bites**, and in **bleeding** after the extraction of a tooth. It is the most efficient last resource when injected into the uterus in **post-partum hæmorrhage**. The lint or cotton wool soaked in the solution may be introduced into the cavity of the nose, rectum or uterus in hæmorrhage from these parts. The solution or the tincture of perchloride mixed with equal quantity of glycerin makes an excellent paint on **enlarged tonsils, diphtheria** and **sore-throat**. The same may be used as a gargle well diluted. A solution of ferrous sulphate (10 grs. to 1 oz. of water) is an extremely useful local application in **erysipelas**, and **erythema**, but it deserves to be noted that its stain on the linen is not removed by washing.

Sometimes the tincture of perchloride may be painted for the same purpose. A solution of sulphate (1 gr. in 1 oz.) has sometimes been found effective in **gleet**.

Internally. **Gastro-intestinal tract.**—As a rule the organic preparations are more easily assimilable than the inorganic. In severe hæmorrhage from the stomach or bowels, as from **ulcers**, innocent or malignant, or **cirrhosis** of the **liver**, the solution or tincture of perchloride is an excellent remedy for arresting it. It may be given in drachm doses every one or two hours with glycerin. The constipating effect of iron is overcome by the addition of a purgative. **Chronic diarrhœa**, rebellious to all manner of treatment, is sometimes wonderfully checked by the solution of pernitrate. **Chronic constipation** may often be successfully removed by ferrous sulphate and extract of nux vomica or extract of belladonna. Humid peroxide of iron is an antidote to **arsenical poisoning**. It can be prepared fresh by mixing a solution of perchloride 3 ozs., with bicarbonate of soda 1 oz., in solution, half an ounce being given every 5 or 10 minutes. Liq. Ferri Dialysati may be given in its stead in ½ or 1 oz. doses diluted. An enema of the tincture of perchloride of iron (1 dr. in ½ pint of water) kills **threadworm.**

Blood.—As a hæmatinic tonic, iron salts stand on a high level, and are used in endless ailments, such as **anæmia, chlorosis, scrofula, cardiac disease, syphilis, Bright's disease, amenorrhœa, malarial cachexia, convalescence** from **acute** or **chronic illness**, &c. A few of them require more than a passing notice.

Anæmia and *Chlorosis.*—Ordinary forms of anæmia traceable to some definite cause, such as **scurvy, malaria, protracted discharges** or **recurrent passive hæmorrhage, lead-poisoning, ankylostomiasis**, &c., are materially benefited by a course of iron, as well as by the removal of the cause, if possible. Iron is the most valuable medicine in chlorosis of young females. Pilula ferri, ferrous sulphate and ferric perchloride are the preparations generally selected. Striking results were obtained by Stockman in chlorosis by the subcutaneous injection of ammonio-citrate in small doses. If the anæmia is due to malaria, Ferri et Quini. Citras, Easton's syrup or pill may be given with advantage. The same preparations may as well be employed as a tonic during convalescence after an acute febrile attack or any other protracted illness. Iron, particularly the perchloride, is very useful in **recurrent passive hæmorrhage** from the nose, uterus or respiratory tract, or in **discharge** from the same or allied parts, as leucorrhœa. The writer once stopped a persistent bleeding from the uterus, caused by a prolonged use of aloes as a purgative for obstinate constipation, when every other hæmostatic failed. Iron often removes that form of **neuralgic pain** or **insomnia** which sometimes accompany anæmia.

Iron is quite useless in the treatment of **pernicious anæmia** and its value is doubted in the anæmia of *leucocythæmia*, *Hodgkin's disease* and *exophthalmic goitre.*

Bright's disease.—Acetate of iron is the most valuable remedy in this disease. It not only removes the anæmia, but lessens or removes the albumen. 10 to 20 ms. of the tincture with half an ounce of the solution of acetate of ammonia, or with potassium acetate, or with both, form an exceedingly useful preparation in **chronic albuminuria**. With many the steel drops is a favourite remedy.

Amenorrhœa due to anæmia often yields to iron especially when given with potassium carbonate or aloes, as for example, Blaud's pill, Pil. Aloes et Ferri and Mist. Ferri Comp. with equal part of decoction of aloes.

Syphilis, *scrofula* and *chronic rheumatoid arthritis* are benefited by a course of iodide of iron. The syrup is ordinarily prescribed in these cases.

Many obscure symptoms dependent on anæmia, such as dyspepsia, headache, vertigo are relieved by a course of iron. Lately the writer has given Tr. ferri perchloride an extended trial in chronic **diabetes**, and is pleased to record that patients improved under its use. The bowels and the digestive functions had to be kept in order.

Erysipelas, diphtheria and many forms of bad sore-throat, such as **hospital sore-throat**, are remarkably benefited by large doses (15 to 30 ms.) of Tr. ferri perchloride given every one or two hours. Many yet recommend steel drops in **puerpural fever**. But the tendency of the present day is to ignore the value of this tried drug.

Nervous system.—Iron cannot directly influence the nervous system, but indirectly it does by improving the nutrition and the general functions of the bodily organs. It has been found efficacious in **chorea, hysteria, neurasthenia**, and in many nervous and subjective symptoms commonly associated with the climacteric period. Easton's syrup or pill, Syr. Hypophosph. Comp., Syr. Ferri Hypophosph., or Syr. Ferri Brom. C. quin. may be selected with advantage.

Caution.—The following points should always be remembered during the administration of iron :—

1. Iron sometimes irritates the stomach of even healthy persons.
2. Never give iron to a patient with a "dirty" tongue. Treat the dyspepsia first and then administer iron.
3. Begin with the mildest preparation and give it after meals.
4. Use it very cautiously in plethoric subjects, or in those who are predisposed to apoplexy.
5 Make a change of the preparation during a course of long iron treatment, or stop it at intervals.
6. Purgatives if necessary should be combined with iron.

7. Occasionally patients cannot bear iron on account of headache, indigestion, &c.

8. Iron should never be given to a patient who is suffering from fever.

Prescribing hints.—The choice of a preparation sometimes becomes difficult to a young practitioner. He should distinguish an astringent from a non-astringent preparation, and bear in mind that there are a few, such as iodide, arsenate, phosphate, and citrate with quinine, whose value depends, mainly or to some extent, upon the other ingredients they contain. The organic salts are non-astringent. Of the inorganic salts, the ferrous salts are less astringent than the ferric salts. These salts may be given in powder, pill, mixture or hypodermically. The perchloride is largely employed in various ways, as a gargle, pigment, spray, dressing (*e.g.*, cotton or lint soaked in solution 15 p.c.), rectal, uterine or urethral injection or mixture. If given in a mixture, glycerin or lemon juice pretty well covers the ferruginous taste The infusion of quassia, calumba or chiretta may be used as a vehicle as they do not contain tannin. The constipating property of iron salts is best removed by Mag. Sulph. if given in a mixture, or by aloes or rhubarb if in pill. The inky color which results if they are combined with cinchona or digitalis, is cleared by the addition of a few drops of diluted phosphoric acid. The action of iron is not affected by this chemical change. Blaud's pill and Griffith's mixture are exceedingly good preparations in anæmia, as they contain alkaline carbonates which tend also to form red blood-corpuscles. Syr. Ferri Phosph. and Syr. Ferri Iodide should be given alone diluted. Ferrous sulphate is given in pill (see p. 88), and if it is intended for action on the intestine it should be coated with Keratin. To prevent the blackening of the teeth, the iron mixture should be swallowed through a glass tube or a quill. Ferri et Ammon. Citras may be given hypodermically (a 5% solution), or in mixture in an effervescing form; care being taken to put the iron in the acid solution. Parrish's chemical food is an excellent preparation for children and delicate females. Citrate of iron and quinine should not be mixed with alkalis or alkaline carbonates as the quinine is precipitated.

FICUS. Figs. N.O. *Urticaceæ.*

Habitat.—Smyrna.

Source.—The dried fleshy receptacles of *Ficus carica.*

Characters.—Consists of the enlarged hollow succulent receptacle bearing numerous achenes on its inner surface.

Composition.—(1) *Sugar.* (2) *Mucilaginous substances.*

Action.—Laxative. **Enters into.**—Confectio Sennæ.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Figs cut open and warmed make a popular emollient soothing poultice.

Internally.—They are a pleasant nutritious food, and have a **mild laxative** action. The seeds produce griping by irritating the mucous membrane. Useful in mild **constipation**.

FILIX MAS. Male Fern. N O. *Filices.*

Habitat.—Britain. Found in the Hymalayas.

Source.—The rhizome of *Aspidium filix-mas.* Collected late in the autumn, divested of its roots, leaves, dead portions, and carefully preserved.

Characters.—3 to 6 in. long. Rhizome ¾ to 1 in. in diameter ; entirely covered with curved, angular, dark-brown bases of the petioles which bear membranous scales ; brown externally, green internally. Transverse section shews 8 pale yellow fibro-vascular bundles. Odor feeble, disagreeable. Taste first sweetish astringent, then bitter and nauseous.

Identification.—It bears no resemblance to any other drug. Its appearance is most peculiar.

Dispensing hints.—It should not be kept over a year.

Composition.—(1) *Filicic acid*, a white amorphous powder, the active principle. (2) *Aspidin*, 3 p.c. a poisonous substance. (3) A *Fixed oil.* (4) A *Volatile oil.* (5) *Resins.*

Action.—A vermicide to tape worm. *Dose.*—60 to 180 grs. powdered.

OFFICIAL PREPARATION.

1. **Ext. Filicis Liq.** *Syn.—Oil of Male Fern.*—A dark green syrupy substance with a disagreeable odor and nauseous taste. **B.P.** **Dose.**—45 to 90 ms.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Male fern is a safe and reliable **anthelmintic** for tapeworm (*Tænia Solium* and *T. Bothriocephalus*), but being a local irritant it causes vomiting. It must be given in pretty large doses (1 to 2 drs.) to adults on empty stomach at bed time, after the bowels have been cleared by a dose of castor oil, followed by a brisk purgative next morning. It is said to expel *Anchylostoma duodenale.*

Prescribing hints.—The liquid extract is best given in fresh milk or emulsified by fresh mucilage of acacia and flavored by chloroform water. The patient should lie down after taking the draught, because it is liable to make him sick. The purgative must be a powerful one so as to weaken the head of the worm and loosen its hold upon the intestine. The head must be carefully looked for in the stools, and if it is not found, a second dose of the drug should be given in two or three days so as to expel it. But if more time is allowed the worm grows again and gets strong and the effect of the second dose may have no more effect than the first. The efficacy of the drug is enhanced by combining it with oil of turpentine. The drug may also be well emulsified by ovi vitellum.

FŒNICULI FRUCTUS. Fennel Fruit. N.O. *Umbelliferæ.*

Syn. I.V.—*Bari Sanf, Saurif,* Hind.

Habitat.—The Central and Southern Europe, Japan, India.

Source.—The dried fruit of cultivated plants of *Fœniculum capillaceum.*

Characters.—$\frac{1}{5}$ to $\frac{2}{5}$ in. long, $\frac{1}{10}$ in. in diameter, oblong, curved, glabrous, greenish-brown or pale-yellowish brown, capped by a stylopod and two styles. Odor aromatic. Taste aromatic, sweet. The fruit is readily separated into 2 mericarps, each of which has 5 prominent primary ridges, and exhibits in transverse section 6 large vittæ.

Identification.—It resembles Caraway, Anise and Conium fruits. Feunel is larger and its vittæ more prominent.

Composition.—(1) A *Volatile oil* (*non-official*). *Dose.*—5 to 15 ms.

Enters into.—Pulv. Glycyrrhizæ Comp. and the

OFFICIAL PREPARATION.

1. **Aqua Fœniculi.**—1 in 20. distil 10. *Dose.*—1 to 2 oz.

PHARMACOLOGY AND THERAPEUTICS.

The same as those of oil of anise or of dill. It is supposed to have the property of increasing the secretion of milk.

GALBANUM. Galbanum. N.O. *Umbelliferæ.*

Habitat.—Persia, the Levant.

Source.—A gum-resin obtained from *Ferula galbaniflua* and from other species.

Characters.—In tears or in irregular masses of agglutinated tears. Tears rounded or irregular, yellowish-brown or orange-brown externally, yellowish-white internally. Rough, dirty, sometimes translucent. Hard and brittle in cold, soft and sticky with heat. Odor characteristic. Taste bitter, unpleasant. *Impurity.*—Slices of root which remain mixed.

Identification.—It resembles ammoniacum, asafetida, benzoin, distinguishable by their respective odors.

Composition.—(1) A *Volatile oil.* (2) *Sulphurous resins.* (3) *Umbelliferone.* (4) *Gum.*

Dispensing hints.—It should be heated to 212° F. and strained before use.

Action.—Antispasmodic, expectorant. **B.P. Dose.**—5 to 15 grs.

OFFICIAL PREPARATION.

1. **Pilula Galbani Composita.** *Syn. B.P.—Compound Pill of Asafetida.*—1 in 3½. **B.P. Dose.**—4 to 8 grs.

PHARMACOLOGY AND THERAPEUTICS.

Its actions and uses are the same as those of asafetida (see p. 254), but less energetic. Sometimes its plaster is applied to **chronic inflammatory swellings.** As it is scarcely prescribed now it may be removed from the B. P.

GALLA. Galls. N.O. *Cupuliferæ.*

Syn.—Nut-galls. **Syn. I.V.**—*Majufal*, Beng. *Maifal*, Hind.

Habitat.—Asia Minor. Imported from Persia, Greece and Turkey.

Source.—Excrescences on a species of oak *Quercus infectoria*, resulting from the puncture and deposition of an egg or eggs of *Cynips gallæ tinctoriæ*.

There are two kinds of galls. The *blue, black or non-perforated galls* collected before the escape of the mature insect are the best. The *white or perforated galls* collected after the escape of the insect are inferior in quality.

Characters.—Hard, heavy, sub-globular, ½ to ¾ in. in diameter, tuberculated on surface. tubercles and intervening spaces smooth, dark bluish-green or dark olive-green externally, yellowish or brownish-white within, with a small central cavity. No odor. Taste intensely bitter.

Identification.—Easy.

Composition.—(1) *Tannic acid* (*off.*) 60 to 70 p. c. (2) *Gallic acid* (*off.*) 3 to 5 p. c.

Incompatibles.—The same as those of tannic acid (*q.v.*)

OFFICIAL PREPARATIONS.

1. **Unguentum Gallæ.**—1 in 5. Pale brown.
2. **Unguentum Gallæ C. Opio.**—7½ p.c. of opium. Brown. May be made directly by mixing opium 15 grs., galls 37 grs., and benzoated lard 148 grs.

3. ACIDUM GALLICUM. Gallic Acid.

$C_6H_2(OH)_3COOH, H_2O.$

Source.—A trihydroxy-benzoic acid, prepared by the action of diluted sulphuric acid on tannic acid.

Characters.—In whitish or slightly brownish acicular needles. No odor. Taste faintly acid. *Solubility.*—1 in 100 of cold; 1 in 3 of boiling water; 1 in 5 of alcohol 90 p.c.; 1 in 12 of glycerin.

Identification.—It is recognised by its pale fawn color, the shape of its crystals and the absence of odor.

Incompatibles.—Spt. æther nitrosi, persalts of iron, metallic salts and caffeine.

Action.—Said to be a remote astringent. **B.P. Dose.**—5 to 15 grs.

NON-OFFICIAL PREPARATION.

1. **Gallanol.** *Syn.—Gallic Acid Anilide.*—In colorless crystals sparingly soluble in water. Used as a substitute for chrysophanic acid.

4. ACIDUM TANNICUM. Tannic Acid.

$C_{14}H_{10}O_9, 2H_2O.$

Syn. B.P.—Digallic acid. Tannin.

Source.—May be prepared by water-saturated ether from galls which have been subjected to a special fermentation.

Characters.—A light brownish powder consisting of thin glistening scales. Odor characteristic. Taste strongly astringent.

Identification.—The general appearance, the faint but characteristic odor and the color help recognition. Sometimes it may be confounded with benzoic acid, but the characteristic odor of benzoin distinguishes it.

Incompatibles.—Gelatin gives a yellowish-white precipitate (not with gallic acid), alkalis, mineral acids, antimonial, lead and silver salts, ferric salts, and vegetable alkaloids.

OFFICIAL PREPARATIONS.

1. **Glycerinum Acidi Tannici.**—1 in 5, or 1 in 6¼ by weight.
2. **Suppositoria Acidi Tannici.**—3 grs. in each.
3. **Trochiscus Acidi Tannici.**—½ gr. in each. *Dose.*—1 to 6.

NON-OFFICIAL PREPARATIONS.

1. **Tannalbin.**—A compound of tannin and albumen. A pale brown tasteless insoluble powder. An intestinal disinfectant and astringent soluble in the intestines. *Dose.*—8 to 15 grs.

2. **Honthin.**—A keratinised greyish-brown compound of tannin and albumen. Very useful in infantile diarrhœa. *Dose.*—3 to 15 grs.

3. **Tannigen.** *Syn.—Di-Acetyl-Tannin.*—A greyish-white powder insoluble in water. Both tannalbin and tannigen appear in the urine as gallic acid. In enteritis and infantile diarrhœa. *Dose.*—3 to 8 grs.

4. **Tannoform.**—A compound of tannic acid with formic aldehyde, in greyish-yellow powder insoluble in water. An excellent anhydrotic, antiseptic and siccative. As a dusting powder in bromidrosis, bed-sores, soft chancres, eczema, &c. Internally in infantile diarrhœa. *Dose.*—10 to 15 grs.

5. **Tannone.**—A condensation product of tannin and urotropine in brownish odorless insoluble powder. Found valuable in tubercular and typhoid diarrhœa. *Dose.*—5 to 15 grs.

PHARMACOLOGY.

Externally.—Tannic acid or substances containing it coagulate albumen, gelatin and mucus, but gallic acid does not. Tannic acid has no action on the unbroken skin, but applied to an exposed mucous membrane or a denuded surface it coagulates the mucus and the albuminous secretions, and forms a firm insoluble protective covering over the part. The coagulated albumen or gelatin resists putrefaction. Absorbed into the tissues, it coagulates the interstitial fluids, and condenses the albuminous and connective tissues, and thereby retards the discharge. Hence it is a **powerful local astringent** It readily coagulates the blood flowing from small cut-vessels, but cannot constrict their calibre as it has no action on their muscular coat. But by plugging the cut ends of vessels as well as by constricting them by the pressure of the peri-albuminous coagulum formed into the tissues around them, it stops hæmorrhage It is therefore a **local hæmostatic**, but not less powerful than the ferric salts. Rosenstirn's experiments prove that blood-vessels are slightly dilated, but the strong constringent effect produced by the coagulum more than counter-balances this feeble dilatation. It slightly depresses the local sensory nerves, and has feeble **antiseptic** and **irritant** properties.

Internally. **Mouth.**—Tannic acid causes dryness of the mouth with a feeling of astringency and of stiffness of the tongue and throat, owing to the coagulation of the secretions of the mucous membranes. It slightly depresses the common sensory nerves and the special nerves of taste.

Stomach.—Its action on the stomach is the same as on the mouth. A portion of it is converted into an albuminate, which is very slow of absorption and is consequently more readily converted into gallic acid in the intestines. Large doses **impair digestion** by precipitating pepsin, but stop hæmorrhage by their **local hæmostatic** property. Often they cause **gastric irritation** and vomiting.

Intestines.—Here also it acts as an astringent and hæmostatic so long it is not **converted into gallic acid** and alkaline tannates. Therefore, to obtain these effects, it should be given in sufficiently large doses. The conversion into gallic acid occurs thus :—$C_{27}H_{22}O_{17}$ (tannic acid) $+ 4H_2O = 3H_3C_7H_3O_5$ (gallic acid) $+$ $C_6H_{12}O_6$ (glucose). The undecomposed tannates and unabsorbed gallates are thrown off with the fæces. Tannic acid cannot affect the biliary secretion.

Blood.—Tannic acid enters the blood mostly as gallates and partly as tannates and circulates as such. Injected into the vein it causes death by thrombosis.

Remote action.—As the gallates and the alkaline tannates thus absorbed cannot coagulate albumen or produce any local astringent effect, it is impossible to accept the theory which many advocate that gallic acid acts as a remote astringent.

Elimination.—There is a great diversity of opinion as to its excretion. According to some, any that has been absorbed is decomposed in the human body, because no derivative of tannic acid can be detected in the human urine or other secretions ; although gallates and traces of tannates are found in the urine of animals. But Stockman found gallic acid with **traces** of tannin in the urine when pure tannin was given by the mouth ; and a **large** amount of tannin with a **little** gallic acid in the urine, when sodium tannate was administered.

THERAPEUTICS.

Externally.—As a **local hæmostatic**, tannic acid is largely employed in **hæmorrhages** from the nose, the rectum, the bladder, the urethra, the uterus, wounds, ulcers, &c. It may be dusted over **wounds** or **ulcers**, or used as a snuff or a nasal douche in **epistaxis**, or as gall ointments or a suppository in **hæmorrhoids**, or as a pessary (10 grs. to 1 dr.) in **cancer of os**, or as a bougie in **gonorrhœal hæmorrhage**. As a *local astringent*, it has been found useful in subduing mild forms of subacute or chronic inflammatory processes and discharges from the skin, as in **eczema**, **intertrigo** (Glyc. Acidi Tannici) ; the ear, as in **otorrhœa** (Glyc. Acid. Tannici) ; the eye, as in **conjunctivitis** and **corneal vascularity** (a collyrium 4 grs. to 1 oz.) ; the nose, as in **ozœna** (a douche, snuff or paint); the vagina, as in **leucorrhœa** (an injection, douche or pessary) ; the uterus, as in **cancer** or **ulcerated os** (pessary or cotton wool soaked in tannic acid and glycerin) ; the urethra, as in **gonorrhœa** and **gleet** (10 grs. to 1 oz. as an injection) ; the bladder, as in **cystitis** (injection) ; and the rectum, as in **ulcers**, **fissures** and **prolapse** of the **rectum** (an injection and suppository). Dr. Ringer recommends tannic acid pomade (tannin 1 dr., glycerin ½ dr., balsam of Peru 20 drops, bitter almond oil 4 drops, lard 1 oz.) in **dandruff**.

Internally. **Alimentary canal.**—Tannic acid makes a very good dentifrice for **bleeding** and **ulcerated gums**. Glycerin of tannic acid is a valuable application in **ulcerative stomatitis**, **subacute**, **chronic** or **aphthous sore-throat**, **relaxed** or **elongated uvula**, **enlarged tonsils**, &c. A gargle (Glyc. acidi tannici 1 dr. to 1 oz.), a spray (1 dr. in rose water 10 ozs.), or lozenges may be used in these cases. An insufflation of tannin with starch makes also an excellent application for the mouth and larynx. It is a valuable remedy for **gastric** and **intestinal hæmorrhage**, but it should be given in large doses, say 30 to 40 grs. every one or two hours. It is a valuable **antidote** in **poisoning** by **alkaloids** and **antimonial salts**. Tannic acid is largly employed in **diarrhœa** either acute or chronic. Tubercular, enteric or dysenteric diarrhœa often yield to its use. The writer has obtained good results in **cholera**, especially in the hæmorrhagic variety, by giving tannic acid 10 grs. and diluted sulphuric acid 10 ms., along with warm rectal injections of tannic acid (30 grs. to 1 qt. of hot water) during collapse.

Notwithstanding the absence of all proofs of their action as remote hæmostatics or remote astringents, gallic acid and tannic acid still find favor with many old-fashioned physicians in the treatment of **internal hæmorrhages**, such as hæmoptysis and hæmaturia ; and of **excessive secretions** from any part of the body, as phthisical night-sweats. As a remedy for **albuminuria** it is valueless.

Prescribing hints.—The different forms in which tannic acid may be used externally have already been noticed. Internally it may be given in solution (see p. 84), cachets, or pills (see p. 88). In the absence of tannic acid any vegetable infusions containing tannin, such as strong tea or decoction of oak-bark, may be employed in alkaloidal poisoning. It should not be combined with ferric salts. Caffeine is precipitated by tannic acid but is redissolved if the latter be in excess.

GAULTHERIÆ OLEUM. Oil of Gaultheria.

(Ind. and Col. Addendum.)

Syn. B.P.—Oil of Wintergreen.

Habitat.—North American Colonies.

Source.—The oil distilled from the leaves of *Gaultheria procumbens* (N.O. *Ericaceæ*), or from the bark of the sweet birch, *Betula lenta* (N O. *Betulaceæ*). It contains at least 90 p.c, generally more, of natural methyl salicylate.

Characters.—Colorless or slightly yellowish. Odor strong, characteristic. Taste warm, sweetish, aromatic. Sp.gr. 1.176 to 1.187. **B.P.**

Dose.—3 to 10 ms.

NON-OFFICIAL PREPARATION AND DERIVATIVE.

1. **Methyl Salicylas. U.S.** (*Synthetic*).—A colorless liquid having the odor and taste of oil of Gaultheria. Less irritating than the natural oil.

1. **Sanoform.** *Syn.—Di-iodo-methyl-salicylate.*—A white crystalline powder insoluble in water. Used externally as a non-irritant substitute for iodoform.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses of this oil are very much the same as those of the salicylates (see p. 195). It is largely employed in America, externally and internally in acute rheumatism. To the imflamed joint it is directly applied by a doubly folded cloth upon which about 50 to 100 drops have been sprinkled and covered with oiled silk or gutta-percha tissue, and renewed twice daily. It causes pain and rubefaction, but the pure methyl salicylate does not do this.

GELATINUM. Gelatin.

Source.—The air-dried product of the action of boiling water on such animal tissues as skin, tendons, ligaments and bones.

Characters.—In translucent, almost colorless, sheets or shreds. A solution in 50 parts of hot water solidifies to a jelly on cooling. Insoluble in alcohol 90 p.c. and ether. Tannin precipitates it.

Enters into.—The preparation of Suppositoria, Glycerini and Lamellæ.

USES.

Gelatin is used as a basis for several pharmaceutical preparations, such as suppositories, pessaries, bougies, discs, gelatin capsules, and as a coating for pills. Glycogelatin (gelatin 1, glycerin 2½, orange flower water 2½, ammoniated solution of carmine *q.s.* to color) is an excellent basis for throat pastilles (see p. 72). Each should weigh 30 grs. It is largely employed in dietary for making jellies, &c.

Medicinally it acts as a hæmostatic, due according to Zibell to an admixture of lime 0·6 p.c. in solution. A 5 p.c. to 10 p.c.

solution may be locally used in wounds, **epistaxis**, &c., or as a sterilized concentrated saline solution hypodermically into the gluteal region in **internal hæmorrhages**.

GELSEMII RADIX. Gelsemium Root. N.O. *Loganiaceæ*.

Habitat.—The south-eastern United States.

Source.—The dried rhizome and rootlets of *Gelsemium nitidum*, the yellow jasmine.

Characters.—Cylindrical, 6 in. long, $\frac{1}{4}$ to $\frac{3}{4}$ in. thick, brown or dark brownish-violet, occasionally attached with fibrous roots. Roots tortuous, finely wrinkled. Odor aromatic. Tatste bitter.

Composition.—(1) *Gelsemine*, a crystallisable alkaloid. (2) *Gelsemin*, a resinoid substance. (3) *Gelsemic acid*, inert but serves a test. (4) *Gelseminine*, a poisonous amorphous alkaloid. (*Carefully note the spelling of these bodies*).

Action.—Analgesic, antispasmodic. *Dose.*—5 to 30 grs. powdered.

OFFICIAL PREPARATION.

1. **Tinctura Gelsemii**.—1 in 10. Pale-brown. **B.P. Dose**.—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Gelsemine**.—In yellowish-white sparingly soluble crystals. Its salts **Gelsemine hydrochloride**, white granular freely soluble in water, was formerly used to dilate the pupil. *Dose.*—$\frac{1}{60}$ to $\frac{1}{20}$ gr.
2. **Gelsemin**.—A pale brown extractive, used as a hypnotic and in neuralgia. *Dose.*—$\frac{1}{2}$ to 2 grs. *Must not be mistaken for the alkaloids.*

PHARMACOLOGY.

Externally.—Topically applied it is a **mydriatic**.

Internally. **Heart and Circulation**.—No action in small doses. In toxic doses it powerfully **depresses** the **heart** and causes a fall of blood-pressure, due to the paralysis of the vagal ends.

Respiration.—In large doses it is a **powerful respiratory sedative**, producing weakness of respiration and death from **asphyxia**. This is caused by the direct paralysis of the respiratory centres in the medulla and cord.

Nervous System. *Brain.*—No action on cerebral centres except drowsiness caused by asphyxia.

Spinal Cord.—It **depresses** first the functional activity of the **anterior cornua**, producing **paralysis** of all the **muscles** of the **body**; then the sensory tracts, with consequent **anæsthesia**, which is but slight. The motor nerve trunks are not affected, but their end-plates only are paralysed just before death. As a consequence of these actions, the gait of the patient becomes staggering and he is no longer able to walk straight, and his general sensibility is lessened. Convulsions precede death, due probably to the asphyxiated condition of the blood.

Eye.—It **paralyses** the **ocular muscles** causing **diplopia** and **ptosis**, owing to the paralysis of the motor cells (centres) in the floor of the fourth ventricle and the Sylvian aqueduct, which are a continuation of the anterior cornual cells. Opinions differ as to its action on the pupil. Some say that it is **dilated**, others that it is **contracted**.

Toxic action.—The symptoms are generally seen to appear in the following order:—Tolerably large doses produce browache, giddiness, ocular pain, dimness of sight. Large doses diplopia and contraction of the pupil. Still larger doses ptosis, weakness of ocular and facial muscles, staggering gait, and sleepiness. Poisonous doses inability to articulate or walk, tremor of the head, quick-feeble pulse, impaired sensibility, general muscular paralysis, cold sweat, fall of temperature, slow and labored respiration, occasional convulsions and death from asphyxia. 2 ozs. of tincture have caused death.

Antidotes.—Emetics or pump. Tannin and potassium bicarbonate freely. Warmth, free stimulation, prolonged artificial respiration, electricity. Strychnine and atropine hypodermically. Nitro-glycerin is a rapid and perfect antidote.

THERAPEUTICS.

Externally.—Gelsemium is rarely used now as a dilator of the pupil. Atropine and homatropine are used in its place. However, discs containing gelsimine $\frac{1}{500}$ gr. each can be had for this purpose.

Internally.—Gelsemium is really a valuable medicine in **dental neuralgia** and **migraine**. It often relieves the former even when the cause is not removed. Its effects are most marked in **neuralgia** of the branches of the **5th nerve** supplying the lower jaw. It may be given alone or better still with butyl chloral hydrate (*q.v.*), gelsemine hydrochloride $\frac{1}{200}$ gr. with pilula butyl chloral (see p. 285) makes an excellent combination, and may be given every two or three hours until the pain is relieved. Sometimes it requires to be pushed till the physiological symptoms appear. It is said to benefit **ovarian neuralgia** and **dysmenorrhœa**. Ringer found the tincture to relieve some forms of **Meniere's disease** in 10 ms. doses, and in 5 ms. doses every $\frac{1}{4}$ hour, the **pain** of **gallstones**. As an antispasmodic in **spasmodic coughs, asthma, tetanus,** &c., it is rarely used now.

Caution.—The drug should be used with great care. It should be immediately stopped, as soon as ptosis or weakness of the muscles are noticed. Its value as a muscular depressant is negatived by other untoward effects. Extra precaution should be taken while prescribing its alkaloids, as **serious mistakes** may occur during dispensing. **Gelsemine** is often mistaken for **gelseminine**.

GENTIANÆ RADIX. Gentian Root. N.O. *Gentianaceæ.*

Habitat.—The Central and Southern European Mountains.

Source.—The dried rhizome and roots of *Gentiana lutea.*

Characters.—In yellowish-brown, entire or longitudinally split, wrinkled, cylindrical pieces, seldom 1 in. thick, varying in length, encircled by leaf-scars and terminated by a leaf-bud. Tough when moist, brittle when dried. Fractured surface reddish-yellow, central portion soft, not radiate. Odor characteristic. Taste first sweetish then bitter. Should not yield *reactions with starch.*

Identification.—It should not be confounded with Belladonna, and Pyrethrum roots. Their distinguishing characters can be better studied by a reference to the following table :—

CHARACTERS.	GENTIAN.	BELLADONNA.	PYRETHRUM.
Color ...	Yellowish-brown externally, reddish-yellow* internally,	Pale grayish-brown externally, white and starchy internally.	Brown, with shining black points internally.
Fractured surface ...	Central portion soft, not radiate. An irregular, dark red ring near the outside bark.	Near to the cambium ring scattered groups of vessels and fibres not radiate. No annular ring. Some cells contain crystals of calcium oxalate.	Traversed by large medullary rays with dark points.
Odor ...	Fragrant, characteristic, which itself may distinguish it.	*Nil.*	Characteristic.
Taste ...	Sweetish at first, very bitter afterwards.	...	A pricking sensation, with a flow of saliva.

Composition.—(1) *Gentiopicrin*, the active principle, a bitter glucoside which splits up into (*a*) glucose, (*b*) gentiogenin. (2) *Gentianic* or *gentisic acid* combined with gentiopicrin. (3) *Gentianose*, a sugar, (4) *Gum.* (5) A *Volatile oil.* No tannin.

Incompatibles.—Iron and lead salts, silver nitrate. Gentian, though it contains no iron, cannot be prescribed with iron as it darkens the mixture.

Action.—Stomachic, bitter tonic.

OFFICIAL PREPARATIONS.

1. **Extractum Gentianæ.**—Aqueous. **B.P. Dose.**—2 to 8 grs.
2. **Infusum Gentianæ Compositum.**—1 in 80. **B.P. Dose.**—½ to 1 oz.
3. **Tinctura Gentianæ Compositum.**—1 in 10. Golden brown. **B.P. Dose.**—½ to 1 dr.

---

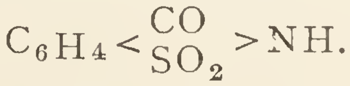
* If dried in an oven it is black. C. & D., 1897, vol. II, page. 198.

NON-OFFICIAL PREPARATION.

1. **Inf. Gentianæ Comp. Con. B.P.C.**—Gentian 2, bitter orange peel 2, lemon peel 1, tincture of fresh lemon peel 1, alcohol 90 p.c. 4, water *q.s.* to 1 pint. By maceration. 1 equal to 8 of the B.P. infusion. *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Its actions and uses are similar to those of calumba (*q.v.*). It is more frequently used than other bitters for its non-astringency. According to Whitla the infusion with a mineral acid checks **vomiting** of **pregnancy** and **retching** remarkably well. The writer has seen it constipate, but how this occurs he cannot explain.



GLUSIDUM. Gluside. $C_6H_4<\genfrac{}{}{0pt}{}{CO}{SO_2}>NH$.

Syn. B.P.—Glucusimide. **Syn. Commercial.**—Saccharin.

Source.—Gluside or Benzoyl sulphonimide is a sweet imide derived from toluene, a derivative of coal-tar.

Characters.—A light, white, minutely crystalline powder. Taste intensely sweet in dilute solutions. *Solubility.*—1 in 400 of cold, and 1 in 24 of boiling water; 1 in 25 of alcohol 90 p.c., slightly in ether and chloroform, also in diluted solutions of ammonia and bicarbonate of soda. *Impurities.*—Sugar, Sulphamido-benzoic acid.

Action.—Antiseptic. A substitute for sugar. *Dose.*—½ to 2 grs.

NON-OFFICIAL PREPARATIONS.

1. **Soluble Gluside.** *Syn.—Saccharinum Solubile.*—90 p.c. in combination with soda. In yellowish white granules easily soluble and more palatable. *Dose.*—½ to 2 grs.
2. **Elixir Glusidi. B.P.C.**—Saccharin 480 grs., Sod. Bicarb. 240 grs., Alcohol 90 p.c. 2½ ozs., Water *q.s.* Mist, dissolve and filter to 1 pint. 1 dr. equal to 3 grs. 20 ms. are sufficient to sweeten 4 ozs. of a mixture. *Dose.*—5 to 20 ms.
3. **Saccharini Tabellæ (discs).**—½ gr. in each.
4. **Diabetin.** *Syn.—Levulose, Inverted Sugar.*—Whitish crystalline powder soluble in water, with a strong sweetening power, suitable for diabetic patients.

PHARMACOLOGY AND THERAPEUTICS.

In large doses, Gluside is an **antiseptic** and passes out with the urine unaltered. It is chiefly used for its sweetening property to cover the taste of unpleasant drugs, and as a substitute for sugar in **diabetes, obesity, dyspepsia,** &c. For its antiseptic action it is useful in cystitis. Soluble gluside being more palatable is better suited for flavoring purposes, as ordinary saccharin leaves a disagreeable after-taste.

GLYCERINUM. Glycerin. $C_3H_5(HO)_3$.

Source.—Glycerin or Glycerol is a trihydric alcohol with a small percentage of water. Obtained by the interaction of alkalis, or of superheated steam, with fats and fixed oils.

Characters.—A clear, colorless, inodorous, sweet, syrupy liquid, miscible with water and alcohol 90 p. c.; insoluble in ether, chloroform and fixed oils. It is neutral, hygroscopic, sp. gr. 1·260. *Impurities.*—Arsenic, copper, lead, iron, calcium, sodium, potassium, ammonium, chlorides, sulphates, cane and grape sugar, butyric acid, fixed mineral matter, and organic matter.

Identification.—The colorless *oily* appearance, the absence of smell and the sweet taste help diagnosis. Most of the B.P. liquids are oily and have characteristic odors.

Action.—Antiseptic, emollient, demulcent. **B.P. Dose.**—1 to 2 drs.

Enters into.—The preparation of all Glycerins (see table p. 26), all Lamellæ (see table p. 29), Conf. Sulph., Ext. Cinch. Liq., Ext. Sarsa. Liq., Lin. Pot. Iod. c. Sapone, Liq. Ethyl Nitratis, Liq. Thyroid., Lotio Hydr. Nig., Mel Boracis, Pil. Ferri, Pil Quin. Sulph., Syr. Pruni Virg., Tr. Chlor. et Morph. Co., Tr. Kino, Tr. Rhei Co., Ung. Acid. Carbol., Ung. Iodi, Ung. Sulph. Iod., and the

OFFICIAL PREPARATION.

1. **Suppositoria Glycerini.**—70 p. c. Translucent cones. Prepared by softening gelatin ½ oz. in water and dissolving it in glycerin 2½ ozs., on a water-bath, and evaporating till the mixture weighs 1,563 grs., when it is poured into moulds.

NON-OFFICIAL PREPARATIONS.

1. **Glycerin Jelly.**—Gelatin 140 grs., Rose water 6 ozs., soak and dissolve, and add white of egg ¾ oz. Heat, and add Glycerin 6 ozs., and Salicylic acid 12 grs. Mix., filter and bottle when warm. Useful in chapped hands, cracked lips and nipples, and for the toilet.
2. **Glycero-alcohol.**—Glycerin 333, distilled water 146, Alcohol 95 p. c. *q.s.* to measure 1000. It keeps indefinitely without evaporation. Recommended as a solvent for alkaloids and active principles by the French.
3. **Glycerinum c. Aqua Rosæ.**—Glycerin 2, Rose water 3. Mix. A pleasant emollient for the skin.

PHARMACOLOGY.

Externally.—Glycerin adheres to the surface to which it is applied, and **absorbs moisture**. It keeps the parts moist and does not itself evaporate. It readily penetrates the unbroken skin and carries with it many substances, such as alkaloids, neutral principles, alkalis, &c., when mixed with it. It is a powerful **antiseptic**, an **emollient**, and a **demulcent**. It renders the skin supple, especially when diluted with water, and allays burning or tingling. Undiluted glycerin is an **irritant** to the mucous surface, and occasionally to the skin.

Internally. **Alimentary canal.**—Undiluted glycerin makes the mouth clammy and sticky. It is a nutrient, because a portion of it when swallowed is absorbed and oxidised in the body, or may go to form adipose tissues. Hence, when continued for a long time, it is sometimes seen to increase body-weight. It is doubtful whether it can affect the metabolism of nitrogenous tissues, but there is evidence that it cannot. In large doses it acts as a **laxative.** Injected into the rectum, it moves the bowels by increasing vermicular contraction of the rectum and the lower bowels by its local irritant effects.

Liver.—Glycogenic function may to some extent be influenced, but it is doubtful whether artificial glycosuria can be prevented.

Blood.—It is freely absorbed by all surfaces. Large doses given to animals destroy their red corpuscles, and the hæmoglobin is dissolved in the plasma, leading to **hæmoglobinuria.**

Elimination.—Glycerin is excreted from the body as a propionic, formic and other acids. The urine of persons taking glycerin gives the copper and fermentation tests for sugar, due to the apprearance of a reducing product which is not sugar. In very large doses the urine becomes dark from the excretion of the hæmoglobin, though no corpuscles have been detected in it.

PHARMACEUTICAL USES AND THERAPEUTICS.

Pharmaceutically.—On account of its valuable physical properties, glycerin is peculiarly fitted for pharmaceutical and dispensing uses. It makes an excellent all-round excipient for pills when combined with acacia or tragacanth mucilage (see p. 86). It is used in the preparation of suppositories, pessaries, pastils, jellies, glyco-gelatine preparations and ointments ; and as a solvent for many alkaloids, active principles, acids, alkalis, neutral salts, glucosides, iodine, bromine, &c. It is a valuable adjunct to lotions for the skin and the hair. As a flavoring agent it is largely employed as a substitute for syrups in mixtures, and as a preservative for organic preparations, such as thyroid solution. As a sweetener and preserver of mixtures it is admirably suited to the Indian climate.

Externally.—As an *emollient,* glycerin diluted with water (1 in 3) or glycerin c. aquæ rosæ is the best application for **chapped lips** and **hands, rough, dry, furfuraceous skin,** and for every kind of skin disease, such as **herpes, eczema, lichen, psoriasis, xeroderma,** &c., which requires an emollient. Mixed with boric acid it is serviceable in **pityriasis** of the body and scalp, and **aphthous** condition of the genitals. It removes dryness of the **meatus** of the **ear,** and heals **excoriation** and **fissures.** It is the best preventive for **bedsores,** when gently rubbed into the parts, before they become tender and red. A 5 p.c. solution of both glycerin and Friar's balsam in rose water prevents a further breaking out of **acne**, when once it is checked. Cotton wool soaked in glycerin and applied to the **os uteri**, by causing a copious watery discharge, relieves congestion of that organ. Many anodynes and antiseptics may be applied similarly by dissolving them in glycerin.

Internally. **Alimentary canal.**—The lips, the tongue and the gums covered with sordes, as in acute febrile diseases, are easily cleaned by keeping them moist with glycerin. The dry, red, glazed mucous membrane of the tongue and throat is made moist and supple by rinsing the mouth with glycerin and water, and thus relieving any **reflex cough** if present. As a **laxative** it is never used by the mouth, but the writer always combines it with castor oil to render it both agreeable and more effective. Glycerin (1 to 4 drs.) is now injected into the rectum by a special syringe to open the bowels in **constipation**. Its suppository may conveniently be used for the same purpose. Its injection is contra-indicated in **piles** and is useless if the fæcal accumulation is very high up. It is recommended in **fermentative dyspepsia** without much benefit. As a sweetening agent for diabetic food it is not much used now.

Lungs.—A tea-spoonful of glycerin alone or diluted with water often relieves **cough**, even that of phthisis. A little lemon juice added to it, makes it more efficacious and moderates its sweetness. Glycerin connot supply the place of cod-liver oil, but it can be usefully combined with it.

GLYCYRRHIZÆ RADIX. Liquorice Root.

N. O. *Leguminosæ.*

Syn. I. V.—*Jashthimadhu*, Beng. *Muleathti*, Hind.

Habitat.—Southern Europe, England, Persia, Afghanistan, India.

Source.—The peeled root and peeled subterranean stem of *Glycyrrhiza glabra*, and other species.

Characters.—Long, cylindrical, before being peeled dark brown and longitudinally wrinkled ; when peeled yellow, fibrous. Odor faint. Taste characteristic, sweet, free from bitterness.

Identification.—It somewhat resembles pyrethrum and taraxacum, which are not sweet. In India the root of *Abrus precatorius* is often sold for the B. P. root.

Composition.—(1) *Glycyrrhizin*, a yellow amorphous glucoside. (2) *Asparagin.* (3) Grape sugar, resin, starch, malic acid, &c.

Action.—Demulcent, a sweetening agent.

Enters into.—Liq. Sarsa Co. Con., Pil. Hydrarg. and the

OFFICIAL PREPARATIONS.

1. **Extractum Glycyrrhizæ.**—An excipient. **B. P. Dose.**—5 to 20 grs. *Enters into.*—Conf. Sennæ, and Decoc. Aloes Co.

2. **Extractum Glycyrrhizæ Liquidum.**—**B.P. Dose.**—½ to 1 dr. *Enters into.*—Mist. Sennæ Co. and Tr. Aloes.

3. **Extractum Glycyrrhizæ Spirituosum.** (*Ind. and Col. Add.*). —Extract of Liqurice 10 ozs., Alcohol 90 p.c. 5 ozs., Water *q.s.* to 1 pint. By solution. **B. P. Dose.**—½ to 1 dr. For use in India and Eastern colonies. Keeps better than the liquid extract.

4. **Pulvis Glycyrrhizæ Compositus.**—1 in 6. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Being sweet it increases the flow of saliva. It is an excellent **demulcent**, and is largely employed in relieving **sore-throat**, for which pieces of the stick of liquorice extract are kept in the mouth. The dried root has no laxative effect, but Pulv. Glycyrrhizæ. Co. (a misnomer) is a mild laxative in virtue of its senna and sulphur. Liquorice makes an excellent excipient and disguises the taste of many nauseous drugs such as aloes, ammonium chloride, cascara sagrada, senna, senega, turpentine, and many bitter substances. Glycyrrhizinum Ammoniatum may be used for the same purpose. 1 gr. will flavor 6 ozs. of mixture.

GOSSYPIUM. Cotton. N. O. *Malvaceæ.*

Syn.—Cotton Wool. **Syn. I. V.**—*Tulla*, Beng. *Rui*, Hind.

Habitat.—Warm and Tropical Countries. Cultivated in India.

Source.—The hairs of the seeds of *Gossypium barbadense* and the species of *Gossypium*, from which fatty matter has been removed. Commonly known as "absorbent cotton-wool."

Characters.—Well known. It should be readily wetted by and quickly sink in water.

THERAPEUTICS.

Externally.—The economic uses of cotton are well known. It is chiefly used as a padding for splints, and as a protective covering for **blistered, burned** or **inflamed surfaces**, as in rheumatism, gout, erysipelas,&c. A pledget of cotton-wool put into the ear prevents **sore-throat**. A thick layer covering the entire limb, and surrounded with a piece of Mackintosh and bandaged, is the best local treatment in **phlegmasia dolens**. In the same way covering the chest, in **bronchitis, pneumonia, pleurisy**, &c. Cotton wool medicated with boric, carbolic and salicylic acids, thymol, iodoform, eucalyptol, sal alembroth, &c., are employed as antiseptic dressings. Sterilised cotton is the best substitute for corks in bacteriological experiments. Pyroxylin is used for making collodion (see p. 353).

PYROXYLINUM. Pyroxylin. $C_6H_8(NO_2)_2O_5$.

Source.—It is dinitrocellulose, though commonly called gun-cotton which is trinitrocellulose, prepared by immersing cotton 1, in a mixture of sulphuric acid 5, and nitric acid 5, for 3 minutes, and then washing, draining and drying on a water-bath.

Solubility.—Readily in a mixture of equal volumes of ether and alcohol 90 p c.

Enters into.—Collodium, Collodium Flexile, Collodium Vesicans. (See p. 353).

Dispensing hints.—Becomes sometimes insoluble on keeping. It is best preserved in a well-stoppered jar by moistening the cotton with methylated spirit. Dry it before use.

GOSSIPII RADICIS CORTEX. Cotton Root Bark.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern, North American and Western Colonies.

Source.—The dried root-bark of *Gossipium herbeceum.*

Characters.—In thin flexible bands, or quilled pieces, covered with a thin brownish-yellow periderm. Inodorous. Taste slightly acrid astringent.

OFFICIAL PREPARATIONS.

1. **Decoctum Gossipii Radicis Corticis.**—Bark bruised 4 ozs., water 2 pints. Boil down to 1 pint. **B.P. Dose.**—½ to 2 ozs.
2. **Extractum Gossipii Radicis Corticis Liquidum.**—1 in 1. Bark 20 ozs., Glycerin 5 ozs., Alcohol 90 p.c. q. S. Percolate to 1 pint. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is largely employed in America as a substitute for ergot, though its effects are not so rapid or reliable.

GRAMINIS CITRATI OLEUM. Oil of Lemon Grass.

N. O. *Gramineæ.* (*Ind. and Col. Addendum*).

Syn. B.P.—Indian Oil of Verbena. **Syn. I. V.**—*Gandha Bena tel*, Beng. *Rusa ka tel*, Hind.

Habitat.—India, Eastern and West Indian Colonies.

Source.—The oil distilled from *Andropogon citratus* (*Andropogon Schœnanthus*).

Characters.—A dark yellow oil. Odor resembling that of verbena. Sp. gr. 0·895 to 0·905.

Composition.—(1) *Citral.* (2) Citronellal &c. **B.P. Dose.**—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is a **rubefacient** like oil of cajuput and may be used diluted with a bland oil in **lumbago, myalgia, rheumatism** &c. It may be rubbed undiluted in chronic cases. It disguises the smell of iodoform. It is largely employed in perfumery and in adultering verbena oil which it resembles.

Internally.—As a **stimulant** and a **carminative** it may be used like other aromatic oils. In **cholera** it is said to arrest thirst and to aid the process of reaction.

GRANATI CORTEX. Pomegranate Bark. N. O. *Lythraceæ.*

Syn. I. V.—*Dárim gácher chhál,* Beng. *Anár ka chhál* Hind.

Habitat.—Southern Europe, Central Asia, cultivated in India.

Source.—Tne dried bark of the stem and root of *Punica granatum.*

Characters.—In curved or chanelled pieces, 2 to 4 in. long, ½ to 1 in. wide. Outer surface of the root bark rough, yellowish-grey with irregular depressions. Stem-bark smoother, bearing minute lichens. Inner surface yellow, tinged with brown. Inodorous. Taste astringent, slightly bitter.

Composition.—The root-bark contains the most alkaloids, more so in that of the red-flowered and white-flowered varieties. (1) *Pelletierine* or *Punicine,* a liquid volatile alkaloid. (2) *Isopelletierine* or *isopunicine.* (3) *Methylpelletierine.* (4) *Pseudopelletierine.* The first two are active and constitute the medicinal pelletierine, and the last two are inert. (5) *Punico-tannic acid.*

Incompatibles.—Alkalis, metallic salts, lime water, gelatin.

Action.—Astringent, tæniafuge.

Official Preparation.

1. **Decoctum Granati-Corticis.**—1 in 5 (10 minutes). **B. P. Dose.**—½ to 2 ozs.

Non-Official Preparations.

1. **Pelletierinæ Sulphas.**—A viscid soluble liquid. *Dose.*—5 to 8 grs. with the same quantity of tannic acid.
2. **Pelletierinæ Tannas.**—A yellowish amorphous powder insoluble in water. *Dose.*—5 to 8 grs.

Pharmacology.

Internally.—The bark and the rind of the fruit are **astringent**. The bark, especially the root-bark, is also a valuable **anthelmintic** for tape-worm. In large doses it causes vomiting and purging. Pelletierine sulphate being soon absorbed by the stomach cannot kill the parasite in the intestine, but in large doses, produces certain constitutional symptoms such as obscure vision, giddiness, muscular weakness and twitchings, &c. These symptoms do not follow the use of the sulphate when combined with tannic acid.

Therapeutics.

Internally.—The decoction of the fresh root-bark is a valuable **tæniafuge**. It should be given every ½ or 1 hour after fasting, or better still after a dose of castor oil and continued even when vomiting takes place. A brisk purgative, such as compound jalap powder should follow its use. Pelletierine salt may be used successfully for the same purpose and with the same precaution. Fresh salts are only reliable as they deteriorate on keeping.

The rind of the fruit is a valuable old remedy for **diarrhœa** and **dysentery** The writer often uses it with good results alone in diarrhœa, and with the rind of *mangosteen* fruit (*Garcinia mangostana)* and with *kurchi* bark (*Wrightia antidysenterica)* in the form of decoction in dysentery. The fresh juice of the succulent seeds is much used as a **cooling beverage** in febrile and other diseases.

GRINDELIA. Grindelia. N. O. *Compositæ.*

(*Ind. and Col. Addendum.*)

Habitat.—Australasian and North American Colonies,

Source.—The dried leaves of *Grindelia squarrosa* and of *Grindelia robusta.*

Characters.—The *leaves* of *Grindelia squarrosa* are alternate, pale-green, smooth, coriaceous, brittle, oblanceolate ; and at the sessile base the involucral bracts are long with reflexed subulate points. The *leaves* of *Grindelia robusta* are almost similar, but shorter and have a cordate amplexicaul base and a serrated margin. Odor balsamic. Taste pungently aromatic, bitter.

Composition.—(1) A *Volatile oil.* (2) A *Resin*, allied to saponin. (3) Probably an alkaloid.

OFFICIAL PREPARATION.

1. **Extractum Grindeliæ Liquidum.**—1 in 1. By percolation with alcohol 90 p.c., water, and sodium bicarbonate. **B.P. Dose.**—10 to 20 ms.

PHARMACOLOGY.

Externally.—It is a local stimulant.

Internally. **Stomach.**—It locally stimulates the stomach and acts as a mild stomachic, and if continued too long, it may cause gastric uneasiness.

Remote action.—After absorption it slows the heart and respiration, but its chief action is on the bronchial mucous membrane which it stimulates, and on the muscular fibre of the bronchial tubes, which it relaxes. It is therefore an **expectorant** and a **bronchial antispasmodic.** In large doses it powerfully depresses the respiratory and cardiac centres, dilates the pupil and causes sleep. The cutaneous sensibility and reflex movements are lessened, and there is incomplete paralysis of the limbs. The oleo-resin is mainly excreted by the kidneys which it stimulates and acts as a mild **diuretic.**

THERAPEUTICS.

Externally.—A lotion (1 dr. of the liquid extract in 6 ozs. of water) makes a useful dressing for **burns** and **ulcers**, and as an injection in **urethritis** and **leucorrhœa.** In America, cloths steeped in it are applied to the skin in **dermatitis** caused by the poisonous ivy (*Rhus toxicodendron*).

Internally.—Its chief use is in **asthma**, 20 or 30 ms. of the liquid extract given every half or one hour, relieve a paroxysm after two, three or four doses. The dried leaves mixed with nitre may be burnt and the fumes inhaled with advantage. It has been found equally serviceable in **spasmodic bronchitis, emphysema, whooping cough** and other spasmodic respiratory troubles. In full doses it is said to arrest **chronic pyelitis** and **chronic cystitis.** Grindelia squarrosa has also been found used in **ague, neuralgia, enlarged spleen,** &c.

GUAIACI LIGNUM. Guaiacum Wood. N. O. *Zygophylleæ.*

Habitat.—St. Domingo, Jamaica.

Source.—The heart-wood of *Guaiacum officinale*, or of *Guaiacum sanctum.*

Characters.—Dark greenish-brown, dense, hard, heavier than water. Taste acrid. Odor when heated aromatic.

Composition.—(1) A *Resin* (*off*). 26 p. c.

Enters into.—Liq. Sarsæ Compositus Conc.

GUAIACI RESINA. Guaiacum Resin.

Source.—Obtained from the guiacum wood.

Characters.—In large masses or sometimes in rounded tears, yellowish-brown to reddish-brown, brittle, breaking with a clean glassy fracture. Thin splinters transparent. Powder greyish, but becomes green by exposure to light and air. *Impurity.*—Colophony (resin). *Solubility.*—About 90 p.c. is soluble in absolute alcohol, chloroform, ether, aromatic spirit of ammonia, and alkaline solutions.

Identification.—The greenish color of the masses, the glassy fracture and the absence of marked odor are characteristic. The student should compare it with aloes, myrrh, benzoin, resin and scammony, which have no greenish tinge, and have characteristic odors. The powdered guaiacum resin is greyish-green and has a characteristic odor.

Composition.—Complex. Contains several resin acids—(1) *Guaiaconic*, (2) *Guaiacic*, and (3) *Guaiaretic acids.* (4) *Guaiac Beta Resin* (5) *Guaiac yellow.*

Incompatibles.—Mineral acids, spirit of nitrous ether.

Action.—Stimulant, diaphoretic, alterative. **B.P. Dose.**—5 to 15 grs.

Enters into.—Pil. Hydrag. Subchlor. Co., and the

OFFICIAL PREPARATIONS.

1. **Mistura Guaiaci.**—11 grs. in 1 oz. **B.P. Dose.**—½ to 1 oz.
2. **Tinctura Guaiaci Ammoniata.**—1 in 5. **B.P. Dose.**—½ to 1 dr.
3. **Trochiscus Guaiaci Resinæ.**—3 grs in each.

NON-OFFICIAL PREPARATIONS.

1. **Tr. Guaiaci. B.P.C.**—Guaiacum 4 ozs., Alcohol 90 p.c., *q. s.* to 1 pint. by solution. *Dose.*—½ to 1 dr.

2. **Chelsea Pensioner.**—The original formula has undergone much modification. The following is commonly used:—Pulv. Guaiaci Res ½ oz., Pulv. Rhei 2 drs., Pulv. Pot. Nitras 1 oz., Sulphur Sub. 1 oz., Pulv. Sinapis 1 oz., Mel *q. s.* M. T. Elect. In chronic rheumatism and chronic gout. *Dose.*—1 to 2 tea-spoonfuls night and morning.

PHARMACOLOGY.

Internally.—Guaiacum resin having an acrid pungent taste increases the flow of saliva. It produces a sensation of warmth in the throat and in the stomach, and increases the movements and the secretion of the stomach and bowels. In large doses it is a **gastro-intestinal irritant**, causing vomiting and purging. It reflexly stimulates the heart. It stimulates the action of the kidneys, of the skin, and slightly of the liver, and is therefore a mild **diuretic, diaphoretic** and **cholagogue.** Some think it is an **emmenagogue** too. According to Dr. Garrod it frequently produces a copious elimination of uric acid in the form of the urates in gouty subjects.

THERAPEUTICS.

Internally.—Its usefulness is most conspicuous in acute *tonsillitis*, almost ranking with aconite or sodium salicylate. The lozenge, taken several times a day, relieves **follicular pharyngitis.** It is recommended in **lumbago, sciatica, neuralgic** and **rheumatic dysmenorrhœa, amenorrhœa** and **chronic rheumatism.** Sir Alfred Garrod praises it in **subacute** and **chronic gout.** According to him it relieves patients suffering from gouty inflammation of a part, if given when they are not very feverish; and acts as a *prophylactic*, if given in the intervals of gouty attacks. As a prophylactic he administers, every morning for years without harm, 10 or 12 grs. of the powdered resin with or without potassium iodide, being washed down with an effervescent draught of citrate of lithium, or lithium guaiacate 5 grs. in pill twice daily. With many chronic rheumatic affections of the joints Chelsea pensioner is a favourite remedy. In **syphilis** it is entirely valueless.

Prescribing hints.—Powdered resin is best given in cachets and ammoniated tincture in milk or sherry, emulsified with mucilage and syrup. Many consider guaiacum mixture to be more effective than the tincture.

GUMMI INDICUM. Indian Gum.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern Colonies.

Source.—A gummy exudation from the wood of *Anogeissus latifolia.*

Characters.—In vermiform or rounded tears, amber colored, translucent, with a dull surface. Fracture glassy. *Solubility.*—In water forming mucilage.

OFFICIAL PREPARATION.

1. **Mucilago Gummy Indici.**—Gum 2 ozs., Water 6 ozs. Dissolve.

PHARMACOLOGY AND THERAPEUTICS.

In India and Eastern Colonies, Indian gum may be used in making official preparations for which gum acacia is used (see p. 169).

GYNOCARDIÆ OLEUM. Gynocardia Oil. N.O. *Bixineæ.*

(*Ind. and Col. Addendum.*)

Syn. B.P.—Chaulmoogra Oil. **Syn. I.V.**—*Chalmugra tel,* Beng., *Hind.*

Habitat.—Found in the forests of the Malayan Peninsula and of the lower Himalya, as far north as Sikkim, and thence as far east as Chittagong and Rangoon.

Source.—The fatty oil expressed from the seeds of *Gynocardia odorata*, or of *Gynocardia Prainii.*

Characters.—Brownish-yellow* of varying consistence. Odor characteristic. Taste acrid. Liquefies fully at 107·6 F., resolidifying at different temperatures down to 60 °F. *Solubility.*—Partly in alcohol 90 p. c., freely in ether, chloroform and carbon bisulphide.

Composition.—(1) *Gynocardic acid,* 21·7 p. c. is the active principle. (2) *Palmitic acid,* 63 p. c. (3) *Hypogæic acid,* 4 p. c. (5) *Cocinic acid,* 2·3 p. c.

Action.—Alterative. **B.P. Dose.**—5 to 10 ms. gradually increased to from ½ to 1 dr.

OFFICIAL PREPARATION.

1. **Unguentum Gynocardiæ.**—Oil 50 grs., hard Paraffin 200 grs., soft White Paraffin 250 grs. Melt and mix.

PHARMACOLOGY.

Externally.—Chaulmoogra oil (when rubbed into the skin stimulates the local circulation and the local nerves. If rubbed too long or every day for some time, it is a **rubefacient.**

Internally—The effect of chaulmoogra oil depends upon its active ingredient *gynocardic acid.* In the beginning, with many it causes loss of appetite, nausea, and even vomiting and purging ; but the stomach becomes soon habituated to its use. After absorption, it acts as an **alterative**, probably by slowly modifying the local nutrition of the morbid leisons and thereby inducing healthier changes in them, and also by improving the general nutrition of the body.

---

* The oil obtained by cold expression is clear, of a pale sherry color ; and that by hot expression, as seen in the bazars, is more or less dark, thick, containing a whitish deposit of fatty substances and impurities. The oil expressed from the seeds of *Hydrocarpus Wightiana* is sometimes substituted for chaulmoogra oil.

THERAPEUTICS.

Chaulmoogra oil has long been known and used in the East as a remedy for leprosy and other skin diseases, but within the past twenty years, the knowledge of it has spread to the West, and its value has been favorably noticed in **leprosy**, **eczema**, **lupus**, **scrofula**, **phthisis**, **rheumatism**, and **gout**. The remedy is employed both externally and internally, and the patient taking it must live generously, as the weak and the underfed are liable to gastric derangement. To test its efficacy in leprosy, a commission was appointed in 1890-91, and from the evidence recorded, it appears to be the best **palliative**, superior to gurjun oil (oil of *dipterocarpus*). The writer considers it more effective in recent cases of leprosy than in old ones, aborting the disease in six months to one year's treatment. He rubs the oil into the diseased patches and gives it internally gradually increasing it to 1½ drs. He finds better results, if it is given with small doses of arsenic, and if the external application is a mixture of equal parts of chaulmoogra oil and *neem* oil (oil of *Melia azadirachta*, see p. 256). Where the stomach cannot bear the oil, **gynocardic acid** in ½ to 3 grs. or **magnesium gynocardate** in 1 to 3 grs. may be given with the same results. As a remedy for other diseases, it has not proved a success except in **chronic eczema**, as a stimulating local application.

Prescribing hints.—Chaulmoogra oil should be given after food in capsules (5 ms. in each), floating on warm milk, or in sweetened emulsion to which a few drops of lemon oil have been added. The after-taste is very well removed by the sucking of a fresh cut lemon. In India the oil is fluid, but in England it is solid. The dose should be gradually increased, and its administration should be suspended if the stomach becomes irritated. The writer has increased the dose gradually to 90 ms. without gastric disorder.

HÆMATOXYLI LIGNUM. Logwood. N. O. *Leguminosæ.*

Habitat.—Campeachy, Honduras, Jamaica.

Source.—The heart wood of *Hæmatoxylon campechianum.*

Characters.—Imported in logs or chips. Logs heavy, hard, orange to purplish-red externally, and reddish-brown internally. Chips or coarse powder should be unfermented, and have a somewhat agreeable odor, and sweetish astringent taste. When chewed it colors the saliva pink.

Identification.—It resembles red sandal wood, which is more dense, and less astringent.

Action.—Astringent.

Incompatibles.—Mineral acids, lime water, tarter emetic.

Composition.—(1) *Tannic acid.* (2) *Hæmatoxylin*, a coloring principle in colorless crystals, which on exposure to light becomes red.

Official Preparation.

1. **Decoctum Hæmatoxyli.**—1 in 20. **B.P. Dose.**—½ to 2 ozs. No iron vessel should be used for boiling.

Non-Official Preparation.

1. **Ext. Hæmatoxyli Liquidum. B. P. C.**—*Dose.*—½ to 2 drs.

Pharmacology and Therapeutics.

On account of its tannic acid, logwood is a valuable **astringent**, and is used in those cases where tannin is indicated. It is generally given in **diarrhœa** of both adults and children in combination with opium and other astringents. Rarely it is prescribed alone. It colors both urine and fæces deep red. This is one of the objections to its use, as mothers object to the staining of the children's diapers. The decoction may be used as an injection in **leucorrhœa.** Hæmatoxylin dissolved in alcohol is used for staining histological specimens.

HAMAMELIDIS CORTEX. Hamamelis Bark.

N. O. *Hamameliaceæ.*

Syn.—Witch-hazel bark.

Habitat.—The United States.

Source.—The dried bark of *Hamamelis virginiana.*

Characters.—In curved pieces; $\frac{1}{16}$ in. thick; 2 to 8 in. long; sometimes covered with a scaly, silver-grey outer bark, marked with lenticels; but often free from outer-bark, then exhibiting a smooth, reddish-brown outer surface; inner surface reddish-pink, striated longitudinally. Taste astringent. Inodorous.

Composition.—(1) *Tannic acid*, 8 p.c. (2) A *Volatile principle* not isolated. (3) *Coloring matter.*

Official Preparation.

1. **Tinctura Hamamelidis**—1 in 10. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparation.

1. **Hamamelin.**. *Syn.—Hamamelidin.*—A Powdered extract. *Dose.*—1 to 5 grs. in pill. A suppository in 1 to 3 grs. with cocoa butter.

HAMAMELIDIS FOLIA. Hamamelis Leaves.

Source.—The leaves fresh and dried of *Hamamelis virginiana.*

Characters.—Broadly oval, 3 to 6 in. long, dark green or brownish-green above, pale below; apex obtuse; base oblique, cordate and shortly petiolate; margin sinuate; veins pinnate and prominent on the under surface, which is furnished with stellate hairs. Taste astringent, slightly bitter. No odor.

OFFICIAL PREPARATIONS.

1. **Extractum Hamamelidis Liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Liquor Hamamelidis.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
3. **Unguentum Hamamelidis.**—1 in 10.
4. **Hazeline** and **Pond's Extract** are also distillates of fresh leaves and twigs. *Dose* of the former is ½ to 3 drs., and of the latter 10 drops hourly.

PHARMACOLOGY.

The witch-hazel is a **local** and a **remote astringent** and **hæmostatic**, but how it acts we do not know, for though the bark contains tannic acid, yet liquor hamamelidis, which is a distillate and consequently contains no tannin, is as active as the tincture prepared from the bark. Dr. Hector Guy investigated its pharmacology but found that it is neither a tonic nor has any action on the heart, blood-vessels or veins. Drs. Wood and Marshall also could not obtain any physiological effects. It is not a poison, but large doses sometimes cause headache.

THERAPEUTICS.

Externally.—As a local astringent or hæmostatic it has been used in various ways and in various affections. A lotion (tincture or liquor 1 in 4 to 10 of water) is a valuable application to **bruises, wounds** and **sores.** It may be used as a gargle in **sore-throat, bleeding** from the **gums, ulcerative stomatitis,** or as an injection in **gonorrhœa, vesical hæmorrhage nasal catarrh, epistaxis,** &c. Hamamelis is a most valuable remedy in internal and external **piles.** Equal parts of hazeline and glycerin soaked in cotton and applied to the **ulcerated** os with congested cervix, subdue the inflammation and heal the ulcer. Its application to **varicoceles** and **varicose veins** has apparently given good results.

Internally.—In all forms of **passive hæmorrhage** hamamelis has been found useful. **Epistaxis, hæmoptysis, hæmatemesis, hæmaturia, menorrhagia** and especially **hæmorrhoidal bleeding** yield to it. It relieves the pain of **dysmenorrhœa,** and according to Brunton it is more effective in **hæmoptysis** than either ergot or digitalis, but certainly it cannot rank with calcium chloride. The writer has obtained decidedly good results in dysentery. It arrests hæmorrhage and to some extent also the discharges of that disease. Its efficacy is most marked in those cases in which the vascular tone is lost, as for intance in dysentery attacking persons suffering from chronic malarial fever and hypertrophy of the spleen. Dr. Preston praises it in

phlegmasia dolens. Many local hæmorrhages are more efficiently checked, when hamamelis is locally applied and also given by the mouth.

Prescribing hints.—The mode of administration of hamamelis in piles requires a fuller description. In the case of external or externo-internal piles, they should be bathed with cold water *and not wiped*, after each defæcation, so as to remove all offending septic particles. A pledget of cotton-wool (or better still prepared sheep's wool) steeped in the ointment or solution, should then be inserted into the rectum to about one-half, leaving the other half outside, so that the sphincter of the anus may grip it in the centre. Thus applied it serves two ends, the upper part of the pledget keeps the medicine applied to piles within the anus, while the lower part of it not only does the same outside the anus, but maintains a gentle pressure over them. In the case of internal piles, the ointment may be introduced by an ointment-introducer or the solution injected by a glycerin syringe. Hamamelin suppository has not been found so successful. If this treatment is persevered in for several months, it not only permanently relieves but cures piles that are not very large.

HEMIDESMI RADIX. Hemidesmus Root.

N. O. *Asclepiadaceæ.*

Syn.—Indian Sarsaparilla. **Syn. I. V.**—*Anantamul*, Beng. *Magrabu*, Hind.

Habitat.—India.

Source.—The dried root of *Hemidesmus Indicus.*

Characters.—Long, rigid, cylindrical, tortuous, longitudinally furrowed, ⅛ in. thick, dark-brown. Cork frequently separated and transversely fissured. Odor fragrant. Taste sweetish.

Identification.—It somewhat resembles ipecacuanha, sarsaparilla and senega. Its rigidity, longitudinal furrow and incomplete transverse fissure will distinguish it from others.

Composition.—(1) *Hemidesmine.* (2) *Tannin.* (3) Starch, &c.

Official Preparation.

1. **Syrupus Hemidesmi.**—1 in 8 by measure. **B.P. Dose**—½ to 1 dr.

Pharmacology and Therapeutics.

The dry root has no action. The fresh root is said to possess **alterative, tonic** and **diaphoretic** properties, and is often prescribed by the unqualified medical practitioners of this country in **chronic rheumatism, syphilis** and many cutaneous diseases, &c. The writer has found the dry root almost inert. It is strange that it is yet retained in the B.P.

HIRUDO. Leeches. N. O. *Annelida.*

Syn. I. V.—*Jonk*, Beng. Hind.

Habitat.—Spain, Italy, France, Hungary.

In India there are many distinct species, which are gathered from marshes and tanks.

Source.—Two species are official :—(1) *Sanguisuga medicinalis,* the speckled leech, whose belly is greenish-yellow and spotted black ; (2) *Sauguisuga officinalis,* the green leech, whose belly is olive-green and not spotted.

HIRUDO AUSTRALIS. Australian Leech.

(*Ind. and Col. Addendum.*)

Source.—Hirudo quinque striata. The five-striped or Australian leech, whose dorsal surface greenish-yellow-brown with 5 longitudinal stripes, and ventral surface greenish-yellow not spotted.

PHARMACOLOGY.

Each leech draws from 1 to 2 drs. of blood, and by subsequent fomentation as much again or more may be abstracted. Its anterior extremity has a sucking disc with a triradiate mouth furnished with sharp teeth, which saw through the skin. The effect of leeching is both local and general depletion. The secretion from the pharynx of the leech prevents coagulation of the blood, hence occasional hæmorrhage after it has dropped. The extract also prevents coagulation of the blood, and arrests putrefaction. Under its influence leucocytes are stimulated and their voracity is increased, so that phagocytosis is augmented.

THERAPEUTICS.

The tendency of the present day is not to abstract blood. Though no doubt by the absolute rejection of leeching, wet-cupping or venesection, a valuable remedy is lost to therapeutics. Leeches are usually applied over deep-seated structures or organs to relieve their congestion or pain ; such as **pleurisy, pneumonia, pericarditis, myocarditis, hepatitis, meningitis, cerebritis, ovaritis, pelvic cellulitis, metritis, orchitis, tonsillitis, laryngitis, otitis, arthritis,** &c. As the extract of leech prevents coagulation of blood, it has been suggested for injection in **thrombosis** or for addition to blood before transfusion.

Mode of application and caution.—(1) A fresh, unused, healthy leech should only be used, for if it has once been applied to a septic surface, it may convey infection.

(2) A prominent part that will admit of pressure in case of excessive hæmorrhage, is to be selected, and cleaned dry, there being no smell of soap, mustard or disinfectants. Lastly it may be as well to wash the part with milk.

(3) In applying, it should not be touched with the fingers of the nurse or attendant. A leech put within a pill-box or a wine-glass, and confined to the skin, is enough to allow it to settle ; but sometimes it refuses to

bite when a little cream or sugar may be applied to the spot, or the part may be scratched with the point of a needle.

(4) A leech glass or a glass syringe through which its head alone can penetrate, should be used for its application to tonsils. os uteri or rectum.

(5) If it is intended that it should bite a particular spot, a perforated piece of paper may first be spread over the skin, keeping open the definite spot for fastening.

(6) It should not be pulled off but allowed to fall itself. If it does not, a little salt sprinkled over will dislodge it.

(7) In case it crawls down the œsophagus or up the rectum, salt water should immediately be given to swallow or be injected into the rectum, when the animal will soon be evacuated.

(8) If the bleeding is not checked by a small ball of cotton-wool and pressure, a pellet of cotton-wool soaked in collodion or in strong solution of iron perchloride, a fragment of matico-leaf, or the stick of silver nitrate thrust within the bite would help to arrest it. If all these measures fail, a needle passed through the bite and a silk thread wound round it in the shape of figure 8 is sure to stop it.

(9) As the marks of leech-bites are indelible such parts only should be selected for application, as will not be exposed to view. As for instance, in otitis on the mastoid process, and in ophthalmia high up on the temple.

(10) It should be applied with great caution to the old, the enfeebled and to children. In a case of children it should not be applied at night, lest a dangerous hæmorrhage should pass unnoticed in the darkness.

(11) It must be remembered that the smoke of tobacco or any other strong smell in a room will go against the animal's fastening.

HOMATROPINÆ HYDROBROMIDUM.

See p. 261

HYDRARGYRUM. Mercury. Hg.

Source.—A metal obtained from native mercuric sulphide (cinnabar).

Characters.—Silver-white, liquid, easily divisible in globules. Volatalises at 662°F. and solidifies at 39°F. *Impurities.*—Lead, tin and other metals.

OFFICIAL PREPARATIONS.

1. **Emplastrum Hydrargyri.**—1 in 3. A bluish solid.
2. **Emplastrum Ammoniaci cum Hydrargyro.**—1 in 5. A dirty-blue solid. Stimulant and resolvent in glandular enlargements, buboes, nodes, lupus and sycosis &c.
3. **Hydrargyrum cum Creta.** *Syn.—Grey Powder.*—1 in 3. A greyish blue powder. *Impurity.*—Mercuric oxide. **B.P. Dose.**—1 to 5 grs. ¼ to ½ gr. for a child 1 year old. Alterative. Useful in children's diarrhœa with pale offensive, green, muddy-coloured or curdy stools, dyspepsia, jaundice, tonsillitis, &c., in ⅛ to ½ gr. 3 or 4 times a day.
4. **Linimentum Hydrargyri.**—1 oint. in 3, or 1 of Hg. in 6. A stimulating absorbent liniment for chronic enlargement of joints.

Produces salivation when applied to the arm-pit on lint. More irritating than plaster or ointment.

5. **Pilula Hydrargyri.** *Syn.—Blue Pill.*—1 in 3. **B.P. Dose.**—4 to 8 grs. Purgative. In biliousness or for general action of mercury with opium.

6. **Unguentum Hydrargyri.** *Syn.—Blue Ointment.*—1 in 2. For general action by absorption.

7. **Unguentum Hydrargyri Compositum.** *Syn.—Scott's Ointment or Dressing.*—1 Hg. in 5. Resolvent. In chronic indurated joints, infiltrations, and glandular enlargements.

NON-OFFICIAL PREPARATIONS.

1. **Lanolinum Hydrargyri.**—Mercury 100, Lanoline 200, Mercurial ointment 5, Mutton Suet 50. More rapidly absorbed. In syphilis as an inunction.

2. **Oleum Cinereum.** *Syn.—Grey Oil.*—Mercury 39, Mercurial ointment 2, Vaseline 59. *Dose.*—1 to 2 ms. hypodermically in syphilis. Not safe.

3. **Mercury Plaster Mull** (Unna).—Mercury 1 gr. to each square inch.

4. **Suppositoria Hydrargyri.**—5 grs. of oint. in each. To produce general action without interfering with digestion.

HYDRARGYRI IODIDUM RUBRUM.

Mercuric Iodide. HgI_2.

Syn. B.P.—Biniodide of Mercury.

Source and **Chararacters.**—A crystalline vermilion powder, obtained by the interaction of mercuric chloride with potassium iodide. *Solubility.*—Insoluble in water, but freely in solution of potassium iodide and ether. **B.P. Dose.**—$\frac{1}{32}$ to $\frac{1}{16}$ gr. in **pilules**, prepared with milk sugar and glucose; or in mixtures of Pot. iodide. **Action.**—Antiseptic, irritant, vesicant. Alterative, deobstruent and irritant poison in large doses.

OFFICIAL PREPARATIONS.

1. **Liquor Arsenii et Hydrargyri Iodidi.**—*Donovan's Solution.* See page 173.

2. **Unguentum Hydrargyri Iodidi Rubri.**—1 in 25. Rubefacient absorbent. Syphilitic warts, nodes, lupus and bronchocele.

NON-OFFICIAL PREPARATIONS.

1. **Injectio Hydrarg. Iod. Rub. Hypodermica.**—Mercuric iodide 1 gr., solution of iodide *q.s.*, water to 64 ms. *Dose.*—2 to 6 ms.

2. **Injectio Hyd. Iodidi. (pro Vagina).**—1 in 10,000. Mercuric chloride 8 grs., Pot. Iodide 5, water 1 oz. 1 dr. to 1 pint of water.

3. **Hydrarg. et Potassii Iodidi.**—Yellow acicular crystals. *Dose.*—$\frac{1}{15}$ to $\frac{1}{4}$ gr.

4. **Hydrargyri Iodidum Veride B.P. 1867.**—A dull green powder decomposing into Hg. and mercuric iodide upon exposure to light. **Action.**—Same as mercuric iodide, but more irritant. *Dose.*—$\frac{1}{6}$ to 1 gr.

HYDRARGYRI OLEAS. Mercuric Oleate.

Source and Characters.—A light greyish unctuous substance obtained by the interaction of mercuric chloride and sodium oleate. **Action.**—The same as liniment or ointment, but absorbed more rapidly. Kills pediculi.

OFFICIAL PREPARATION.

1. **Unguentum Hydrargyri Oleatis.**—1 in 4.

HYDRARGYRI OXIDUM FLAVUM.

Yellow Mercuric Oxide. Hgo.

Source and Characters.—A yellow non-crystalline powder obtained by the interaction of mercuric chloride and sodium hydroxide. $HgCl_2 + 2NaHO = HgO + 2NaCl + H_2O$. Insoluble in water.

OFFICIAL PREPARATION.

1. **Unguentum Hydrargyri Oxidi Flavi.**—1 in 50. **Action.**—Parasiticide and alterative. Valuable in tinea tarsi, corneal ulcer, obstinate conjunctivitis, and the eczema of the eye-lids. It is a substitute for **Golden Ointment.**

HYDRARGYRI OXIDUM RUBRUM.

Red Mercuric Oxide. HgO.

Source and Characters.—An orange red powder obtained by heating mercurous nitrate until acid vapors cease to be evolved. Insoluble in water.

OFFICIAL PREPARATIONS.

1. **Unguentum Hydrargyri Oxidum Rubri.** *Syn. B.P.—Red Precipitate Ointment.*—1 in 40. Locally stimulant and absorbent. Diluted in ophthalmia like yellow mercuric ointment. In syphilitic sores and skin diseases.

NON-OFFICIAL PREPARATIONS.

1. **Hydrargyri Cyanidum.**—White or colorless crystals, obtained by boiling red mercuric oxide with Prussian blue. A powerful antiseptic. As a lotion to syphilitic sores, and in pill $\frac{1}{10}$ to $\frac{1}{12}$ gr. In diphtheria $\frac{1}{150}$ gr. with Tr. aconite 1 m. frequently. *Dose.*—$\frac{1}{20}$ to $\frac{1}{4}$ gr.
2. **Mercuro-Zinc Cyanide.**—A white powder recommended by Lord Lister as an unirritating antiseptic to make gauze, and ointment for eczema.

HYDRARGYRI PERCHLORIDUM.

Mercuric Chloride. $Hg\,Cl_2$.

Syn. B.P.—Bichloride of Mercury, Corrosive Sublimate, Perchloride of Mercury.

Source.—A salt obtained as a sublimate by heating a mixture of mercuric sulphate, sodium chloride, and a little black oxide of manganese, $HgSO_4 + 2NaCl + MnO_2 = HgCl_2 + Na_2SO_4 + MnO_2$.

Characters.—Heavy colorless masses of prismatic crystals. *Solubility.*—1 in 16 of cold, 1 in 2 of boling water ; 1 in 3 of alcohol 90 p.c. 1 in 4 of ether ; 1 in 2 of cold glycerin on trituration. *Impurities.*—Fixed salts, not volatilising.

Incompatibles.—Alkalis and their carbonates, potassium iodide, lime water, tartar emetic, silver nitrate, albumen, lead acetate, soaps, decoction of bark.

N. B.—Perchloride of mercury decomposes even in distilled water, calomel being deposited. If organic substances are present, the change takes place more rapidly. Ordinary well water is therefore not a good vehicle with which to prepare solutions of the perchloride. The addition however of some free acid—such as ordinary vinegar (1 in 125) or tartaric acid—will prevent this decomposition.

Action.—Antiseptic, disinfectant, antiparasitic, alterative, antisyphilitic. A powerfully irritant poison. **B P. Dose**.—$\frac{1}{32}$ to $\frac{1}{16}$ gr. in solution. Hypodermically with sodium chloride.

Official Preparations.

1. **Liquor Hydrargyri Perchloridi**—½ gr. in 1 oz. A colorless solution, each drachm containing $\frac{1}{16}$ gr. **B P. Dose.**—½ to 1 dr. diluted.
2. **Lotio Hydrargyri Flava.** *Syn. B.P.—Yellow Wash.*—Color due to yellow oxide. Resembles yellow oxide ointment in action.

Non-official Preparations.

1. **Corrosive Sublimate Pastils or Discs.**—Containing 8¾ grs. of mercuric chloride with the same weight of sodium chloride, colored violet. 1 disc in 1 pint of water is equal to 1 in 1000
2. **Sublimate Wood-Wool or Wool.**—½ p.c. of Corrosive Sublimate.
3. **Sal Alembroth.** *Syn.—Ammonio-Mercuric Chloride.*—Prepared by interaction of ammonium chloride with mercuric chloride. Soluble 2 in 1 of water. **Alembroth Gauze.**—1 p. c. Damped with carbolic lotion before use as a dressing. **Alembroth Wool.**—2 p. c. Tinted blue. **Hypodermic Injection.**—½ gr in water, as an intra-muscular injection into buttocks for syphilis once or twice a week.
4. **Hydrargyrum Carbolicum.**—Colorless crystals or white powder. In secondary syphilis especially syphilitic psoriasis and tubercular or macular eruptions. *Dose.*—⅛ to ½ gr. in *Pill* 3 or 4 times a day.
5. **Glutinopeptonate of Corrosive Sublimate.**—Soluble silky scales. 4 grammes in 100 cubic centimetres of water make a 1 p.c. mercurial solution. One Pravaz syringeful every day hypodermically in syphilis. Abscesses do not follow and no chance of relapse after 4 weeks.

HYDRARGYRI SUBCHLORIDUM.

Mercurous Chloride. Hg_2Cl_2.

Syn. B.P.—Calomel, Hydrargyri Chloridum, Subchloride of Mercury.

Source—A salt obtained as a sublimate when a mixture of mercurous sulphate and sodium chloride is heated. $Hg_2SO_4 + 2NaCl_2 = Hg_2Cl_2 + Na_2SO_4$.

Characters.—A dull white heavy nearly tasteless powder. *Solubility.*—Insoluble in water, alcohol 90 p. c. or ether. Volatilised by heat. *Impurities.*—Mercuric chloride soluble in water, and other chlorides.

Test for impurity.—Take a clean knife, put on it a drop of water and add a few grains of the suspected calomel. After the lapse of a minute wash the blade, when there should be no dark stain. If a black spot of magnetic oxide forms, that shows the presence of perchloride.

Action.—Alterative, purgative and diuretic. **B.P. Dose.**—½ to 5 grs. 1 gr. for a child 1 year old.

OFFICIAL PREPARATIONS.

1. **Lotio Hydrargyri Nigra.** *Syn.—Black Wash.*—3 grs. to 1 oz. The black precipitate is H_2O. A stimulating alterative lotion to syphilitic sores.

2. **Pilula Hydrargyri Subchloridi Composita.** *Syn.—Compound Calomel Pill. Plummer's Pill*—1 in 4½. An orange colored mass. **B.P. Dose.**—4 to 8 grs. Alterative and feeble cathartic.

3. **Unguentum Hydarargyri Subchloridi.**—*Calomel Ointment.*—1 in 10. Rarely used. Relieves the itching of eczematous eruptions about the anus and genitals. Salivation rare.

NON-OFFICIAL PREPARATION.

1. **Calomel Cream.**—Calomel 10 grs. Vaseline to 1 oz.

HYDRARGYRUM AMMONIATUM.

Ammoniated Mercury NH_2HgCl.

Syn. B.P.—Ammonio-Chloride of Mercury, Mercuric Ammonium Chloride, White Precipitate, White powder. Insecticide. Not used internally.

OFFICIAL PREPARATION.

1. **Unguentum Hydrargyri Ammoniati.** *Syn.—White Precipitate Ointment.*—1 in 10. Stimulant and alterative in chronic parasitic skin diseases as scabies, ringworm, impetigo, &c., and destroys pediculi.

LIQUOR HYDRARGYRI NITRATIS ACIDUS.

Acid Solution of Mercuric Nitrate.

Source and Characters.—A colorless solution of mercury in nitric acid and water. *Impurity.*—Mercurous nitrate. **Action.**—Antiseptic, caustic. To destroy syphilitic warts, tubercles, ulcers, cancerous growths, and lupus; care being taken that surrounding healthy tissues are not touched. **Gargle.**—1 to 2 ms. in 1 oz. of water. **Gonorrhœal injection.**—1 m. in 2 ozs. of water.

OFFICIAL PREPARATIONS.

1. **Unguentum Hydrargyri Nitratis.** *Syn.—Citrine Ointment.*—1 in 16¼. Pale lemon color. Great care and skill are necessary in its preparation. **Dispensing Hints.**—Diluted with lard becomes leaden colored, but less with spermaceti and least with paraffin ointments.

Action.—Stimulant, alternative. In *tinea tarsi* with 7 of vaseline. **Incompatibles.**—Camphor, essential oils, lard &c. Aborts whitlows and boils.

2. **Unguentum Hydrargyri Nitratis Dilutum.**—1 in 5. A stimulant and alterative application to scaly eczema. Diluted with glycerin and brushed inside the nostrils cures inveterate ozœna.

NON-OFFICIAL PREPARATION.

1. **Unguentum Metallorum.**—Is a mixture of oxide of zinc, diluted with nitrate of mercury and acetate of lead ointments in equal parts. Largely used in chronic eczema.

ADDITIONAL NON-OFFICIAL PREPARATIONS OF MERCURY.

1. **Hydrargyri Benzoas.**—A white crystalline powder. For hypodermic injection in solution which should be prepared fresh. Hydrarg. Benzoas. 5 grs., Sodium Chloride 1½ grs., Water 10 drs. ; one Pravaz syringeful daily.

2. **Hydrargyri Formamidum.**—1 per cent solution for hypodermic injection from ½ to 1 Pravaz syringeful. Not so successful.

3. **Hydrargyri Gallas.**—Dark-green insoluble powder, being more stable and rapidly absorbed. *Dose.*—½ to 1 gr. in primary and secondary syphilis.

4. **Hydrargyri Napthol-acetas.**—An insoluble white powder. *Dose.*—½ to 1 gr. In syphilis as intra-muscular injection. Not so successful.

5. **Hydrargyri Salicylas.**—A white powder, slightly soluble in water. Powerful antiseptic and antisyphilitic. For syphilitic sores, as ointment or dusting. Corrosive sublimate 1, Sod. Salicylas 2, Water 1,000, form a good lotion for external application.

6. **Hydrargyri Silico-Fluoridum.**—A colorless soluble salt used as a substitute for sublimate, but less irritating and less poisonous.

7. **Hydrargyri Sozoiodol.**—A pale yellow powder, soluble in solution of sodium chloride. Hypodermically in 1 gr. doses. Sprinkled over chancres and syphilitic sores (1 in 15).

8. **Hydrargyri Succinimidum.**—A white silky powder soluble in water, highly recommended for hypodermic injection. A Pravaz syringeful of 2 p. c. solution into the buttock is the usual dose.

9. **Hydrargyri Tannas.**—A green tasteless powder decomposed by weak alkalis setting free globules of mercury. Rapidly absorbed from the intestines without the disagreeable symptoms of mercurials, and producing best results in syphilis. *Dose.*—1 to 2 grs. in pill.

10. **Hydrargyri Thymolacetas.**—A white crystalline insoluble powder, produced by mixing acetate of mercury and thymol. Internally in ¼ gr. and subcutaneously with vaseline oil into the muscles. Injections are stated to be free from the danger of abscesses.

PHARMACOLOGY OF MERCURY AND ITS SALTS.

Externally.—Metallic mercury and its salts are **absorbed** by the unbroken skin when either applied, rubbed over, or fumigated. They enter easily through the hair and sebaceous follicles as an oxide or a chloride in combination with the fatty acids of the sebaceous glands. But on the denuded skin and mucous membranes, they produce certain **definite** actions which are given below :—(1) All mercurials are **antiseptic** and **disinfectant** ; more especially the corrosive sublimate, which, 1 in 500,000, prevents the growth of, and 1 in 25,000 destroys, ordinary bacilli. The German Plague Commission to Bombay have proved that a 1 p. c. solution of sublimate kills the plague bacillus immediately. Besides many of them, such as ammoniate, nitrate, perchloride, oleate and oxide destroy animal parasites, hence they are **antiparasitic**. (2) Weak solutions of corrosive sublimate ($\frac{1}{8}$ to $\frac{1}{4}$ gr. in 1 oz.), mercurous and many mercuric ointments are **antiphlogistic, astringent, stimulant** and **resolvent**. (3) Stronger solutions, as of the acid nitrate and perchloride, cause **inflammation** ; and the concentrated ones **sloughing**. (4) A portion of the applications enter the circulation and produce **general** and **specific** effects.

Internally.—All mercurials produce similar actions after absorption, though they have different local effects which are exactly the same as externally, according to the nature and strength of the preparations used.

Gastro-intestinal tract.—Mercurial salts affect the mouth, gums and salivary glands causing **salivation** and **stomatitis**, not due to their direct influence on these parts, but influencing remotely by their excretion. In the **stomach** they are converted into a complex albuminate containing albumen, sodium chloride and chlorine, which is insoluble at first, but becomes soluble in excess of albumen or sodium chloride that exists in the stomach ; and are therefore easily absorbed. In the duodenum and upper part of the small intestine, metallic mercury, such as grey powder, blue pill, and calomel **increases** the **glandular secretions** and **peristalsis**, thereby helping the evacuation of bile into the duodenum. The contents of these parts are so rapidly hurried out, that the bile is not reabsorbed as happens normally, consequently the stools are **dark-green** (calomel motions) but not loose. Hence they are **purgatives**. The purgative is greatly helped by salines. If the doses are insufficient, or sometimes from idiosyncracy, mercury may be absorbed producing constitutional symptoms, but is afterwards re-excreted and thrown out with the rest, as a sulphide with the fæces. Mercurials arrest **putrefactive changes** in the duodenum and intestine, thereby checking flatulence. As the result of the arrest of putrefactive changes, biliverdin passes unchanged, and no Indol is formed. Hence calomel stools are not only grass-green but they are singularly free from putrefactive odor.

Liver.—It is a mistake to say now that mercury increases the amount of bile formed in the liver, though perchloride does to some extent. A portion of calomel may be converted into perchloride, and in large doses it may diminish the bile secretion. Metallic mercury and calomel increase the evacuation of bile and check its re-absorption in the way already explained, but the gall-bladder and the bile-ducts are believed also to be stimulated. Hence they are reckoned as **indirect cholagogues** (see p 132).

Blood.—The soluble complex mercurial albuminate freely enters the blood from the stomach and the intestines ; and on entering, it is decomposed by oxygen and albumen, forming an **oxyalbuminate** In *minute and continued doses* mercuric chloride not only increases the **number of red corpuscles,** but increases their **hæmoglobin,** and thus adds a little to the body weight. In this sense it may be considered as a **tonic.** In *large doses* it causes **anæmia** ; but how far these actions are due to the improvement or impairment of digestion, or to its action on the blood itself, is not yet known. It arrests the movements of leucocytes and thus acts as an **antiphlogistic**. The mercury undergoes the same changes through whatever channels it enters the circulation.

Kidneys.—Calomel or sometimes blue pill, in 3 to 5 grs. doses, occasionally acts as a **diuretic** in cardiac dropsy. Serious consequences may follow if the kidneys are diseased ; for it may cause albuminuria. It aids the diuretic action of squill and digitalis.

Skin.—The skin readily absorbs mercury, continued inunction gives rise to a crop of irritable pimples or an eczematous eruption. It has no diaphoretic action and does not influence temperature.

Elimination.—Mercury is slowly eliminated by the urine, bile, milk, sweat, saliva, and especially so if the kidneys are diseased. It is excreted with fæces as a sulphide. It accumulates in the body, and can be detected in every organ, but largely in the liver, and cancellous tissue of bones. During its excretion by the saliva it affects the salivary glands, largely increasing the **salivary secretion,** by acting either on their secreting cells or the terminal ends of the nerves in them. (See page 123).

Specific action.—Mercury has a specific, at least an antidotal action on **syphilis,** especially in its primary and secondary stages, but how it acts is not known. Possibly by affecting the life-process and growth of germinal cells, or by its destructive influence on organisms or ferments, which give rise to such physiological and pathological changes, as are manifest in syphilis.

Toleration.—Age, sex and idiosyncracy greatly modify the action of mercurials. Children as a rule bear mercury better than adults, and males better than females. Patients suffering from granular kidney, scrofula, scurvy and malarial cachexia are peculiarly susceptible to this drug. Some are so peculiarly susceptible to this drug, that very small doses may cause salivation. The writer treated a patient, in whom 3 grs. of calomel with compound colocynth extract, produced severe mercurialism although he was purged by the pill. Pregnancy is no bar to the administration of mercury.

Acute toxic action.—Acute poisoning is not common. Corrosive sublimate is often taken. Not long ago a person accidentally took corrosive sublimate, mistaking it for camphor and died. Mercurials, especially the mercuric salts produce severe **gastro-enteritis**, with vomiting, pain, purging, and bloody stools, collapse and even death.

Antidotes.—Emetics, stomach pump cautiously, and then only at the very commencement. Demulcent drinks, milk, albumen, oil, gluten freely. It is a better plan to wash the stomach after demulcent drinks are given. Morphine and alcohol subcutaneously.

Chronic toxic action. Hydrargyrism or Mercurialism.—This is now rare, but occurs accidentally or through the malpractice of quacks. The first indications of mercurial poisoning are the fœtor of the mouth, and the soreness of the gums (the medicinal administration of mercury should not go further), soon followed by a disagreeable metallic taste ; swollen, red, spongy gums, bleeding on the least touch ; increased salivary discharge and offensive breath. These symptoms increase, the tongue becomes furred and swells, tonsils and pharyngeal glands enlarge, parotids and salivary glands enlarge and become tender, teeth get loosened, gums recede and become ulcerated, saliva gets thick and viscid, and pours out of the mouth, fever and depression set in, &c. If the dose is large and continued long, these symptoms are aggravated, and end in the falling of the teeth, ulceration and abscesses of the mouth, necrosis of the jaw-bones, great prostration, anæmia, emaciation, occasional hæmorrhage, and death.

Protracted exposure to a moderate degree of mercurial vapor, produces a different train of symptoms, generally known as **mercurial palsy or cachexia.** Besides the cachectic symptoms there are muscular tremors, first beginning at the face, then invading the arms and the legs, resembling paralysis agitans, extreme weakness of the affected muscles (mercurial palsy) ; mental weakness, and functional disturbance of special senses.

Metallic mercury vaporises even at the ordinary temperature and may produce poisonous effects, even though the evaporating surface be small, if the emanations from it continue for any length of time.

Several cases are on record in which mercurial cachexia has resulted from vaporisation of the mercury with which the backs of mirrors are coated. The student should bear this fact in mind for future guidance.

THERAPEUTICS OF MERCURY AND ITS SALTS.

Externally.—**As an antiseptic**, cyanide and perchloride of mercury are used, but the solution of the latter is largely employed for **disinfecting** purposes, as well as in **surgical** and **obstetric** practice. A lotion (1 in 1,000) is strong enough for washing infected rooms, furniture, articles, linen, the Surgeons' and Gynæcologysts' hands, the parts to be operated upon, and for soaking lints, towels, wool, &c. A lotion (1 in 10,000) may be ordinarily used for washing wounds and ulcers, but the former strength can be advantageously employed if they are foul or of syphilitic origin. In midwifery practice, a solution of 1 in 5,000 is fairly strong for washing vagina and uterus, but its strength requires to be diminished to 1 in 10,000, if used for continual irrigation. Caution should be taken when using a lotion of 1 in 500.

Professor Lockwood prefers the lotion of the soluble iodide as this salt does not combine with albumen and there is therefore less risk of absorption. Moreover it does not give the wound that "pickled" appearance which results from the use of the perchloride.

As an antiparasitic.—Citrine and white precipitate ointments and perchloride lotion (1 to 2 grs. in 1 oz. of water) are employed to destroy the fungus of **tinea**, such as of ringworm, mentagra, and **favus** ; and the **animal** parasites, such as the various kinds of lice and their nits and the acarus The red oxide or citrine ointment is very effective in **tinea ciliaris.** The eye-lashes should be cut short, and the scabs removed before the ointment is applied, diluted if necessary. Oleate is an useful application in **pityriasis versicolor.**

As an allayer of itching.—Blue ointment, calomel ointment (1 dr. to 1 oz.), black wash and yellow wash relieve the distressing itching of many **skin diseases**, such as, urticaria, prurigo, pruritus ani, pruritus pudendi, psoriasis, lichen, pityriasis of the scalp and eczema. If applied with care and not to a large area, there is very little danger of salivation.

As a stimulant and absorbent.—The plaster, the liniment, and the various ointments, such as, oleate, red precipitate, Scott's and red iodide are used for dispersing **glandular enlargements**, as buboes ; and for absorbing inflammatory products, as in **chronic joint disease, chronic peritonitis** and **periostitis.** Ung. Hyd. Iod. Rubri is a capital application for **goitre,** which should be exposed to the sun or to strong heat. It is also said to absorb **bony tumors** and out-growths of horses and cattle. Plastermulls, liniment and ointment soaked on lint are the usual methods of such an application. Calomel dusting removes pustular conjunctivitis.

As an antiphlogistic.—Diluted citrine ointment aborts **whitlow** and **boils** when applied over, and then covered with plaster. Mr. Marshall strongly recommends oleatum hydrargyri (liquid) 5 p. c. with morphine (1 in 60) in **synovitis, articular inflammation, mammary** and other glandular inflammations, **tonsillitis, epididymitis, threatened suppuration** or abscess, &c. Mercurial ointment is useful in **onychia** and **paronychia.** A ten minutes' application followed by a poultice every hour cuts short the inflammation. Scott's dressing applied to the **indurated** and **inflamed carbuncle** softens and subdues inflammation.

As an irritant and caustic.—Mercuric nitrate lotion is employed to destroy **warts, condylomata, lupus** and other small excrescences, but, much of this caustic action is no doubt due to the free nitric acid it contains

As a specific.—Mercurial ointments, black wash and yellow wash are always prescribed for dressings over **chancres** and other **syphilitic sores.** Blackwash is an unirritating application, when the sores are kept wet with a bit of lint soaked with it. Nothing is so good as to wash all suspicious sores with a perchloride lotion (1 in 500). According to Ringer a cyanide of mercury lotion (5 to 15 grs. in water 1 oz.) is a good local application to syphilitic sores, such as those of the penis, throat, tongue, anus, &c. Besides their use in syphilitic sores, they are of great service in all varieties of skin diseases, originating from syphilis. Local use must be combined with internal administration.

Finely powdered calomel is also applied locally in syphilitic and other affections of the eye (phlyctenular ophthalmia). When applied in this way it is important to bear in mind that potassium iodide must not be simultaneously administered internally, otherwise it will appear in the lachrymal secretion and then, mixing with the calomel, will produce an iodide of mercury and violent inflammation of the eye will be the result.

Internally. **Gastro-intestinal tract.**—Local **syphilitic sores** in the mouth soon heal by the perchloride mouth-wash (Perchloride 4 grs. Acid Hydroch. Dil 10 ms. in water 10 ozs.) **Vomiting** in infants occurring suddenly sometimes, or inmediately after the milk has been swallowed, is stopped by grey powder in $\frac{1}{12}$ gr. or $\frac{1}{3}$ gr. given every 2 or 3 hours (Ringer). **Infantile diarrhœa** whether acute, subacute or chronic, with clay-coloured, offensive, or dark-green, or slimy, or curdy stools, soon yields to small doses of calomel or grey powder. In **infantile cholera,** the vomiting and purging are soon arrested by an hourly dose of grey powder ($\frac{1}{6}$ gr.). **Cholera** too in adults has been checked by calomel given in 2 to 3 gr. doses alone, or in combination with bismuth and camphor Large doses (20 to 30 grs.) of calomel are utterly useless in this disease. In that form of **quinsy** or **scarlatina**, in which the difficulty in breathing is insuperable, Ringer recommends $\frac{1}{3}$ gr. of grey powder every hour. Cases of obstinate **hiccough** have been checked by small doses of calomel. Blue pill or calomel is given as a **purgative,** but it should never be prescribed to habitual opium eaters, or to a patient under opium treatment, for fear of absorption and constitutional symptoms. In every case of mercurial purgative, it is a good plan to follow it by a saline aperient. A mercurial preparation should not also be given nightly as a purgative, for it not only loses its effect, but there is a chance of accumulation. Sometimes, it produces severe gastroenteritis. Perchloride of mercury $\frac{1}{100}$ gr. given hourly or every two hours, has been recommended by Ringer in **chronic**

diarrhœa of adults marked by pale watery stools, and in acute and chronic **dysentery**. A full dose as large as can be borne has sometimes produced wonderful results in **ulcerative enteritis**. Calomel or grey powder in small doses or as a purgative clears the thickly coated creamy tongue of many acute diseases.

In **biliousness** or **hepatic derangement** due perhaps to free living, a dose of blue pill or calomel at night, followed by a dose of compound senna mixture, or Seidlitz powder or compound liquorice powder next morning, produces excellent results.

Inflammatory diseases.—Few now prescribe mercury in **acute inflammatory diseases**, except in **iritis**, but there are many who yet use it in **meningitis** and inflammation of other serous membranes, whilst American writers are now recommending its use in **endocarditis**.

Dropsy and ascites.—Calomel given several times a day acts as a diuretic in **cardiac dropsy**. Its efficacy is greatly increased if combined with digitalis and squill, as in Guy's pill (see page 377). It is said also to benefit, though temporarily, **ascites** due to **cirrhosis** of the **liver**. It should never be given in renal dropsy.

Syphilis.—Mercury is the antidote for syphilitic virus. Its efficacy is most marked in **primary** and **secondary syphilis**, but opinions differ as to its efficacy in tertiary syphilis. In **soft chancre** it is positively injurious. In true **hard** or **indurated chancre**, mercurials should not only be employed locally, but given internally until the thickening and induration pass away. Mercurialism should never be induced. Any non-irritant preparation, such as calomel, Plummer's pill, blue pill or grey powder should be steadily continued till the gums are affected, or symptoms of salivation threaten, when its use should be suspended for a while. Calomel 1 gr. with opium $\frac{1}{4}$ gr., Plummer's pill 5 grs., or grey powder 2 grs., are generally used for this purpose. Besides giving by the mouth, the constitution can be soon brought under the influence of mercury by other methods, which are detailed below. Though mercury is not recommended in **tertiary syphilis**, the writer often uses it with potassium iodide with decided good results. According to Keyes an unremitting use of mercurials in small doses for two years can eradicate the poison from the constitution. Green iodide is still prescribed, but its instability is a serious drawback. Grey powder is an excellent remedy for **congenital syphilis**. The routine treatment for a child six months old is half a grain three times a day for 3 days, then once at night, so long as the child thrives.

Modes of administration.—Mercury can be introduced into the system by the following methods :—

1. **By the mouth**.—By this route we administer blue pill, calomel,

grey powder, corrosive sublimate, &c., for absorption by the mucous membranes of the stomach and intestines.

2. **By the rectum.**—Mercurial suppository is used for local action.

3. **Inhalation** —This method is rarely resorted to.

4. **Fumigation.**—Volatilised calomel is administered by this method (see page 70). Simultaneous diaphoresis induced either by steam or jaborandi given internally, helps its action. Fumigation sometimes causes great weakness and prostration, but on the whole, it is considered to be the best, for it does not disorder the functions of the stomach and bowels. Many rebellious cases of syphilis, where the administration by the mouth has failed, yield to fumigation or inunction. Fumigation can be used for local and general action.

5. **Inunction.**—By rubbing blue ointment, liniment or oleate of mercury into the skin, mercury can be rapidly introduced into the blood. The inner surface of the thigh, or the axilla of young children are suitable spots for inunction. 20 to 60 grs. of blue ointment may be rubbed nightly or every other night. The site of rubbing should be varied for fear of local irritation. The German ointment (1 of Hg. in 3) is no doubt superior to the B.P. preparation, and much of the success of the treatment of syphilitic cases at Aix, is due probably to the superior climate of the place, and the regulated life of the patients.

6. **Endermically.**—Calomel is dusted over raw blistered surface or ulcer or mercurial lotion applied. Mercury may thus be absorbed.

7. **Hypodermically.**—This method is much practiced on the continent. Several preparations are used for this purpose. Mercuric chloride $\frac{1}{8}$ gr. with a trace of sodium chloride in 10 ms. of distilled water is generally used for a single dose. Grey oil produces local irritation. Several non-official preparations are used hypodermically. Intra-muscular injection preferably at the outer part of the gluteal region, is the rule. $\frac{1}{6}$ gr. of morphine should be injected before the mercurial injection, to prevent pain. By this method a patient is soon brought under the influence of mercury without affecting digestion.

8. **Intravenous injection.**—Lane injected successfully 20 ms. of a 1 p. c. solution of cyanide of mercury into the most prominent vein below the elbow.

9. **Baths.**—Mercuric chloride is used for a bath (see page 65).

Caution.—Unless appetite and digestion are good, the mercury should not be given by the mouth. Weak, anæmic, scrofulous and renal subjects cannot bear mercurials. For fear of absorption it should not be employed over a large area. Concentrated solutions should not be used as injections into the vagina and uterus.

The following instructions should be given to a patient when he is to be placed upon a prolonged course of mercury :—

(1) Avoid fruits, green vegetables, coffee and aperients.
(2) Lessen your stimulants.
(3) Stop smoking altogether.
(4) Dress warmly and beware of chills.

HYDRASTIS RHIZOMA. Hydrastis. N.O. *Ranunculaceæ.*

Syn.—Golden Seal.

Habitat.—United States and Canada.

Source.—The dried rhizome and roots of *Hydrastis canadensis.*

Characters.—Rhizome ½ to 1½ in. long, ⅛ to ½ in. thick, tortuous, simple or branched, yellowish-brown becoming darker by age. Cup-shaped scars of decayed branches on the upper surface. Rootlets from the lower surface and sides. Fracture resinous, brownish-yellow. Odor characteristic. Taste bitter.

Incompatibles.—Tannic acid, hydrochloric acid and alkalis.

Composition.—It contains alkaloids (1) *Berberine,* (2) *Hydrastine,* (3) *Canadine.*

Action.—Stomachic, tonic and hæmostatic.

OFFICIAL PREPARATIONS.

1. **Extractum Hydrastis Liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Tinctura Hydrastis.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Extractum Hydrastis.**—The liquid extract evaporated. *Dose.*—2 to 5 grs.
2. **Hydrastin.**—Contains Hydrastine and Barberine Hydrochloride. An eclectic remedy. *Dose.*—2 to 6 grs.
3. **Hydrastina.**—A white crystalline alkaloid resembling strychnine in appearance. Acts like quinine though milder. *Dose.*—¼ to 1 gr. in pill, or hypodermically.
4. **Hydrastinæ Hydrochloridum.**—A faintly yellow crystalline salt, soluble in water. *Dose.*—½ to 1 gr.
5. **Hydrastinine.**—An oxidation product of natural *Hydrastine* alkaloid.
6. **Hydrastininæ Hydrochloridum.**—A pale yellow crystalline powder. soluble in water. Strengthens weak labor pains and checks uterine hæmorrhage. *Dose.*—¾ to 1½ grs. 10 p.c. Solution hypodermically.

PHARMACOLOGY.

Externally.—Hydrastis acts as a **stimulant** and **antiseptic** to ulcerated surfaces.

Internally.—Hydrastis being bitter, promotes appetite and digestion, and stimulates gastric and intestinal secretion and peristalsis. It is therefore a **stomachic, tonic** and **mild laxative.** It is said to possess an alterative or tonic action on the mucous surfaces. It slightly increases the secretion of bile and urine. It contracts the unstriped muscular fibres of the arteries and those of the uterus, hence it is **hæmostatic** and **uterine contractor,** though the contractions are not so strong as those produced by ergot. In large doses it is a **cardiac depressant,** and causes fall of blood pressure Hydrastine produces nervous symptoms similar to those of quinine, and is a mild **febrifuge.** It contracts the tissues of the engorged spleen, and thereby reduces its size. It is said to produce abortion but this is doubtful.

THERAPEUTICS.

Externally.—Hydrastis has been employed as a dressing to chronic unhealthy ulcers, and as an application to eczema (5 to 20 grs. in lard 1 oz.). Hydrastin (1 dr. in mucilage acacia 4 grs.) or the tincture or liquid extract (2 to 4 drs. to 1 pint) makes an efficient lotion for injection in **gonorrhœa** after the acute stage, **gleet, leucorrhœa, cystitis, otorrhœa,** &c. Whitla thinks that a weak infusion of hydrastis is more potent in these cases. Locally it has also been used to arrest **hæmorrhage** from the nares, rectum and uterus, and in **hyperidrosis, acne,** &c. Better results are always obtained by combining external treatment with internal use.

Internally.—Either the liquid extract or the tincture (diluted with an equal part of water) can be used as a gargle in **aphthous stomatitis** and **chronic pharyngitis,** or as an injection for **chronic nasal catarrh, otorrhœa, leucorrhœa,** or **gonorrhœa.** Hydrastine insufflation is a good local application for the latter disease, and an ointment of the strength of 5 to 20 grs. in 1 oz. has proved useful in **eczema.** Hydrastis is one of the remedies we have for chronic **gastric** and **intestinal catarrh,** especially if it be the result of chronic alcoholism. On account of its contractile action on the unstriped muscular fibres of all the arteries and those of the uterus, it has been largely employed in arresting **hæmorrhages,** especially the **uterine.** In short, it may be used in all cases where ergot is indicated. One of the notable effects of hydrastis is, that it not only checks uterine hæmorrhage but soothes uterine and ovarian pain, and has therefore been employed in **menorrhagia, dysmenorrhœa, metrorrhagia, endometritis** and in the reduction of **uterine tumors.** It does not cause painful contractions like ergot and is therefore sometimes used to stengthen weak labor pains. Some authors claim that it is useful for the same **diseases of the heart** as are benefitted by digitalis. As an **antiperiodic** it is far inferior to quinine. It has been found very useful, on several occasions, for checking the nightsweats of phthisis.

HYDROGENII PEROXIDI LIQUOR.

Solution of Hydrogen Peroxide. H_2O_2.

Source.—Prepared by the interaction of water, barium peroxide and a dilute mineral acid, at a temperature below 50°F. Should yield 10 times its volume of oxygen.

Characters.—A colorless, odorless liquid with a slightly acid taste. Renders saliva frothy. It readily decomposes on coming in contact with metallic oxide or heat. *Impurities.*—Barium, mineral matter and less oxygen.

Action.—Powerfully antiseptic, alterative. **B.P. Dose.**—½ to 2 drs. in solution.

NON-OFFICIAL PREPARATIONS.

1. **Oxygen water.**—Is drunk as an exhilarating beverage. Used in diabetes, dyspepsia, tetanus, hydrophobia, eclampsia, exophthalmic goitre and pneumonia.

2. **Oxygen gas.**—Compressed oxygen gas is obtainable in cylinders containing 12 to 20 cubic feet. Before inhalation, a rubber tube with an inhaler may be attached, the gas coming out in a gentle stream. Dr. G. Stoker has recently been very successful in the treatment of **indolent ulcers** by exposing them to the vapor of oxygen gas, which has the power of killing off putrefactive bacilli and stimulating the growth of benign microbes. **Oxygen inhalation** is of great use in pneumonia, relieving dyspnœa and reducing pyrexia. It is successfully employed in cardiac and respiratory failure, Bright's disease, angina, asthma, phthisis, &c.

3. **Oxydol.**—Formerly known as "*Eau Maiche*" contains 3 times its volume of available oxygen. Recommended as a wound dressing.

4. **Ozonic Ether.**—A more stable preparation miscible with water. In conjunction with Tr. guaiacun it acts as a test for blood, the color of which it changes to blue. Recommended in diabetes and whooping cough. *Dose.*—½ to 1 dr.

5. **Pyrozone.**—Is an American speciality containing hydrogen peroxide of several strengths. A 3 p. c. solution is used internally as an antiseptic, and a 25 p. c. solution in ether as a caustic.

6. **"Sanitas" Fluid.**—Contains, as active principles, hydrogen peroxide, thymol, soluble camphor and camphoric acid. It is a non-poisonous antiseptic.

PHARMACOLOGY.

Externally.—Hydrogen peroxide is newly introduced into the B.P. Being a powerful oxidising agent, it destroys organised ferments, having no effect on diastase fermentations. A few drops of a 1½p.c. solution destroy hydrophobic virus. It causes effervescence when in contact with pus, thus killing bacteria. Hence, it is a powerful **antiseptic** and **disinfectant**. It bleaches hair and cleanses the skin.

Internally.—The action is antiseptic and alterative like that of iodine.

THERAPEUTICS.

Externally.—Hydrogen peroxide is largely used in dental surgery, and many cosmetics owe their efficacy to its presence. A solution (1 in 8) may be used with benefit in **sores, foul suppurating wounds, chancres** and **fœtid discharges from the ear.**

Internally.—As a spray and pigment it has been used in diphtheria and scarlatinal sore throat, and the injection of its solution effects the cure of necrosis of the jaw. It has been recommended in many infective diseases and metabolic disturbances, such as,. **scarlatina, fever, diabetes, pertussis, albuminuria** on theoretical grounds but with poor results, and it has been used in the form of vapor to prevent cyanide poisoning in gold mines.

HYGROPHILA. Hygrophila. N. O. *Acanthaceæ.*

(*Ind. and Col. Addendum*).

Syn. B.P.—Asteracantha. **Syn. I.V.**—*Kule-khárá*, Beng. *Tálmákhána.* Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried herb including the root of *Hygrophyla spinosa.*

Characters.—Roots with numerous rootlets, tapering ; stem 2 to 4 ft. high, quadrangular, branches and leaves opposite. Leaves entire, 6 at each node ; outer two about 4 to 5 in. long and ½ in. broad ; 4 inner about 1½ in. long. In the axil of each leaf, is a yellowish spine about 1 in. long. Leaves and stems are furnished with hispid, spreading, scattered white hairs. Flowers bright purplish-blue, four pairs at each node. Calyx four sepals, one broader than the others. Corolla glabrous, two lipped with didynamous stamens. Ripened ovary with 4 to 8 seeds.

Composition.—*Colesterol* an alkaloid. *Inorganic salts*, *fixed oil* and *mucilage.*

Action.—Demulcent and diuretic.

OFFICIAL PREPARATION.

Decoctum Hygrophilæ.—1 in 10. **B.P. Dose.**—½ to 2 ozs.

NON-OFFICIAL PREPARATION.

Acetum Hygrophilæ.—Dried leaves 2 ozs., distilled vinegar 16 ozs. Macerate 3 days, then press and strain. *Dose.*—½ to 1½ ozs.

PHARMACOLOGY AND THERAPEUTICS.

The entire plant is considered by the Indians to possess diuretic and demulcent properties. It is therefore used as a diuretic in dropsical cases and in hepatic obstruction with dropsy, and as a diuretic and demulcent in urinary affections such as cystitis and gonorrhœa. The roots are bitter, and may therefore be used as a **diuretic, tonic** and **demulcent.**

HYOSCYAMI FOLIA. Hyoscyamus Leaves.

N. O. *Solanaceæ.*

Syn. B.P.—Henbane Leaves. **Habitat.**—Britain.

Source.—The fresh leaves and flowers, with the branches to which they are attached, of *Hyoscyamus niger*, also the leaves and the flowering tops separated from the branches and carefully dried, collected from the flowering biennial plants.

Characters.—Leaves vary in length up to 10 in., sessile, alternate, exstipulate, triangular-ovate or ovate-oblong, acute, sinuate, pale-green, furnished with glandular hairs particularly underneath. Branches subcylindrical and glandular-hairy, corolla yellow, odor strong, taste bitter and slightly acrid when fresh.

Resembles.—Belladonna and Stramonium leaves, neither of which is hairy.

Composition.—Two crystallisable alkaloids (1) *Hyoscyamine* and (2) *Hyoscine* (Scopolamine), and a poisonous oil.

Incompatibles.—Liquor potassæ, lead acetate, silver nitrate, and vegetable acids.

Action.—Anodyne, sedative, narcotic.

OFFICIAL PREPARATIONS.

1. **Extractum Hyoscyami Viride. B.P. Dose.**—2 to 8 grs.
2. **Pil. Colocynthidis et Hyoscyami.**—See Colocynth, page 355.
3. **Succus Hyoscyami. B.P. Dose.**—½ to 1 dr.
4. **Tinctura Hyoscyami.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS.

1. **Chloroformum Hyoscyami.**—Hyoscyamus Root in powder 30, Chloroform 20.
2. **Tinctura Hyoscyami Radicis.**—Hyoscyamus Root in powder 5, Alcohol 60 p.c. 40, digest for 7 days. *Dose.*—20 to 60 ms.

PHARMACOLOGY.

Hyoscyamine, the principal alkaloid in the hyoscyamus, is isomeric with atropine and is easily converted into the latter in the presence of a fixed alkali at the ordinary temperature. Most of the properties of hyoscyamus must therefore be naturally identical with those of belladonna and stramonium (see Belladonna, page 262). The following are however the chief points of difference : (1) Hyoscyamus is less deliriant and has a marked and rapid **sedative and soporific effect on the cerebrum**. (2) It has also a more pronounced **sedative action** on the **spinal cord**. (3) It *increases* the **peristaltic contraction** *of the intestines* and is at the same time more **efficacious in relieving griping** and **irregular contraction**, thereby acting as a carminative. (4) It is **not** a powerful *stimulator* of the **heart**. (5) It relieves **irritation of the urinary passages**, *especially that of the bladder*. This it does by depressing the terminal ends of the nerves of the mucous membrane, and controlling the spasms of the muscular fibres. (6) Hyoscine *diminishes intra-ocular tension*, and therefore hyoscyamus does not affect this so much as belladonna. Some authorities say that it acts as a laxative, but the writer has not observed this effect in medicinal doses.

THERAPEUTICS.

Besides its use in those cases where belladonna is indicated, it is employed (1) to soothe cerebral excitement and produce sleep, as in **mania** and **insomnia** ; (2) to lessen **cardiac asthma** ; (3) to correct the painful griping of purgatives ; (4) to relieve **vesical spasm** in cystitis, prostatitis, calculus, &c., often in combination with other urinary sedatives as buchu, pariera, &c. and the alkalis ; and (5) to relieve cough, as in bronchitis.

Children can bear very large doses, while the old and weak cannot.

HYOSCINÆ HYDROBROMIDUM.

Hyoscine Hydrobromide.

Syn. B.P.—*Hydrobromate of Hyoscine, Scopolamine Hydrobromide.*

Source.—The hydrobromide of an alkaloid contained in hyoscyamus leaves, different species of Scopola, and other solanaceous plants.

Characters.—In colorless, transparent crystals, permanent in the air and soluble 1 in 4 of water, not 1 in 1 as in the B.P.

Action.—Hypnotic. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. either by the mouth or hypodermically. May be increased to $\frac{1}{50}$ gr.

NON-OFFICIAL PREPARATIONS.

1. **Injectio Hyoscinæ Hypodermica.**—1 in 200 ms. of distilled water. *Dose.*—1 to 2 ms.
2. **Hypodermic Lamels** contain $\frac{1}{200}$ gr. each with gelatin.
3. **Guttæ Hyoscinæ.**—2 grs. in water 1 oz.
4. **Ophthalmic Discs** contain $\frac{1}{500}$ and $\frac{1}{200}$ gr.

PHARMACOLOGY AND THERAPEUTICS.

Hyoscine has a powerful sedative action on the convolutions of the brain and produces sleep, and is largely employed in **mania, insomnia, insanity, delirium tremens,** and **puerperal mania.** It is not a depressant to the heart, though it slows the pulse, but till more is known of its action it is not safe to use it in valvular diseases, with a failing compensation. It has a prolonged mydriatic action. It acts wonderfully in calming down maniacs. Merck's preparation should alone be prescribed, as the commercial specimens vary much in purity. It is safer to use at first a lower dose $\frac{1}{600}$ to $\frac{1}{200}$ gr. hypodermically.

The writer used it with good results in a case of hysterical insanity with wakefulness in doses of $\frac{1}{100}$ gr. .

HYOSCYAMINÆ SULPHAS. Hyoscyamine Sulphate.

Source.—The sulphate of an alkaloid contained in hyoscyamus leaves and possibly other solanaceous plants.

Characters.—A crystalline, deliquescent, odorless powder, having a bitter, acrid taste.

Tests.—It is distinguished from atropine by its brilliant **golden-yellow scales,** when its acidulated solution is acted upon by the solution of auric chloride; whilst with atropine, the precipitate has a **dull pulverulent appearance.**

Action.—Sedative and hypnotic. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. by the mouth or hypodermically.

NON-OFFICIAL PREPARATIONS OF HYOSCYAMINE.

1. **Hyoscyaminæ Hydrobromidum.**—In small white granular crystals soluble 3 in 1 of water. *Dose.*—$\frac{1}{120}$ to $\frac{1}{40}$ gr.
2. **Injectio Hyoscyaminæ Hypodermica.**—Sulphate 1 gr., Distilled Water 2 drs. *Dose.*—1 to 2 ms.
3. **Hypodermic Lamels.**—$\frac{1}{50}$ gr. in each.
4. **Ophthalmic Discs.**—$\frac{1}{5000}$ gr. each.
5. **Hyoscyamine granules.**—$\frac{1}{250}$ gr. each. Useful in sea-sickness.

PHARMACOLOGY AND THERAPEUTICS.

Hyoscyamine resembles in action atropine more than hyoscine, but its mydriatic effect is more intensified. It has been used in **mania, insomnia, delirium tremens, chorea, neuralgia, asthma** and **paralysis agitans**, with less benefit than hyoscine. Ringer says that he tried it in delirium tremens without any success, and found identical results in acute mania with atropine. Sometimes it produces sleep where opium has failed. Only Merck's preparation is reliable. It should be used with caution.

IODOFORMUM.

Iodoform. Tri-iodomethane. CHI_3.

Source.—Prepared by the action of iodine on ethylic alcohol in the presence of solution of potassium carbonate. $C_2H_6O + 4I_2 + 3K_2CO_3 = CHI_3 + KCHO_2 + 5KI + 2H_2O + 3CO_2$.

Characters.—Shining, lemon-yellow, small, hexagonal crystals, unctuous to the touch, with a persistent and disagreeable odor and taste. Volatilises slowly and contains iodine 96·7 p. c. *Solubility.*—Slightly in cold water, 1 in 7 of ether, 1 in 14 of chloroform, 1 in 120 of alcohol 90 p. c, 1 in 100 of glycerin, 1 in 30 of olive oil, and also in fixed and volatile oils. Sparingly in Benzol. *Impurities.*—Soluble yellow colouring matters, iodides, picric acid.

Incompatible.—Calomel.

Action.—Antiseptic, deodorant and alterative. **B.P. Dose.**—½ to 3 grs. in pill or emulsion.

OFFICIAL PREPARATIONS.

1. **Suppositoria Iodoformi.**—3 grs. in each. A local antiseptic and anæsthetic.
2. **Unguentum Iodoformi.**—1 in 10. Antiseptic, disinfectant and antisyphilitic.

NON-OFFICIAL PREPARATIONS.

1. **Iodoformum Præcipitatum.**—A primrose-yellow, impalpable powder.
2. **Buginarium Iodoformi et Eucalypti** (Cheyne).—Iodoform 5 grs., Eucalyptus oil 10 ms., Cacao butter 35 grs. in each. In Gonorrhœa.
3. **Collodium c. Iodoformo.**—Iodoform 1, Collodion Flexile 12. As a pigment in venereal sores and glandular swellings.
4. **Emulsio Iodoformi.**—Iodoform 10, Glycerin 70, Water 20. For injection into sinuses, and abscess cavities.

5. **Insufflatio Iodoformi** (T. H.).—Iodoform 1, Bismuth Subnitras 1, or Iodoform 2, Starch 1. Mix. In affections of the ear, nose and throat.

6. **Nebula Iodoformi** (T. H.).—Iodoform 40 grs. in ether 1 oz. Strong antiseptic and detergent.

7. **Iodoform Dressings.—Gauze**, 5, 10, 20 p. c.; **Wool** and **Lint**, 3, 5 and 10 p. c.; **Plaster Mulls**, 10 p. c.

8. **Iodoform Varnish (Whitehead's).**—Contains Iodoform 10 p. c. in Tr. Benz. Co. of which ether is substituted for alcohol.

9 **Pastillus Iodoformi** (T. H.).—1 gr. with glyco-gelatin 18 grs. in each. In syphilitic eruptions of the tongue, mouth, throat &c.

10. **Ung. Iodof. C. Atropina.**—Iodoform precipitated 60 grs., Atropine 2 grs., Soft Paraffin 1 oz. Dissolve atropine by heat, and mix Iodoform when cold.

11. **Unguentum Iodo-Paraffini.**—Iodoform 1, Oil of Eucalyptus 8, dissolve by gentle heat, and add to melted Paraffin 27 and Soft Paraffin 6, stir until cold.

Substitutes for Iodoform.

1. **Airol.** *Syn.*—Bismuth Oxy-iodo gallas.—See Bismuth. (P. 275).

2. **Antiseptol.** *Syn.—Cinchonine Iodo-sulphate.*—Iodine 50 p. c. Cheap and free from odor. Ointment 1 dr. in 1 oz. zinc ointment for lupus, &c. (Shoe maker).

3. **Aristol.** *Syn.—Di-Thymol-Iodide.*—Prepared by mixing solution of iodine in potassium iodide with thymol solution. A reddish-brown powder insoluble in water and glycerin, but soluble in collodion, ether and oils. Useful in ulcerative lupus, tinea, eczema, psoriasis, when applied as an ointment 10 p. c., or dusted, or in collodion.

4. **Bismuth Resorcinate, Sodium-phospho-salicylate,** and **Subgallate** (see Bismuth p. 276).

5. **Creosal** and **Cresalol** are powerful antiseptics superior to iodoform, since they are harmless and less disagreeable in their odor, besides have astringent action. The former is given in 15 grs. in intestinal phthisis, and the latter in 3 to 8 grs. in diarrhœa and typhoid fever.

6 **Di-iodoform.** *Syn.—Ethylene Periodide.*—Prismatic, yellow inodorous needles, insoluble in water, soluble in chloroform and ether.

7. **Eka-iodoform.**—A compound of iodoform and paraform having strong antiseptic action.

8. **Eudoxin.**—See Bismuth page 276.

9. **Europhen.** *Syn.—Isobutyl-ortho-cresyl-iodide.*—Yellow amorphous powder with saffron odor containing 28 p. c. iodine, insoluble in water and glycerin, but soluble in chloroform, ether. Used as a dusting powder and ointment 10 p. c. It is bland, unirritating and harmless and is considered to be the best substitute for iodoform. Flick rubs ½ oz. solution (1 in 20) of olive oil in early phthisis into the groins and arm-pits with good effect. Used also hypodermically 15 ms. of a 1 p. c. solution in olive oil in secondary syphilis.

10. **Iodoformin.**—A compound of iodoform and hexamethylenetetramine. A white powder turning yellow by exposure.

11. **Iodoformal.**—A compound of iodoform and ethyl-hexamethylene-hydriodide possessing higher antiseptic properties than either iodoform or iodoformin.

12. **Iodoformum Bituminatum.**—A compound of tar and iodoform, having an agreeable odor. Employed like iodoform in the powdered form.

13. **Iodol.** *Syn.—Tetra-Iodo-Pyrrol.*—A brownish-white powder without disagreeable smell and toxic action, insoluble in water, but soluble in 1 in 145 of glycerin, alcohol, chloroform and ether. Externally it acts like iodoform, and internally like potassium iodide in 5 to 10 grs. in pill or capsule.

14. **Iodo-Salicylic Acid** and **Di-Iodo-Salicylic Acid.**—Are compounds of iodine and salicylic acid and having the combined action of both. Antithermic, analgesic and antirheumatic. Succeeded where salicytates failed. The dose of the latter 20 grs. and upwards.

15. **Loretin.**—A yellowish odorless crystalline powder, being a non-irritating and non-poisonous substitute.

16. **Losophan.** *Syn.—Meta-Tri-Iodo-Cresol.*—A greyish crystalline odorless powder, containing iodine 80 p.c. Recommended as an anti-parasitic.

17. **Nosophen.** *Syn.—Tetra-iodophen olphthalein.*—A cream-colored almost odorless powder containing 60 p.c. of iodine. Combines with bases (see Bismuth, p. 276). A good intestinal antiseptic. *Dose.*—3 to 8 grs.

18. **Naphthol-Aristol.** *Syn.—Di-Iodide of B-naphthol.*—A greenish, yellow, odorless, tateless powder, employed in skin diseases.

19. **Sanoform.** *Syn.—Methyl-Di-Iodo-Salicylate.*—Light-white odorless, non-poisonous, un-irritating crystals, containing iodine 66 p.c. Said to possess wonderful desiccating properties, useful in ophthalmic practice, and ulcers.

20. **Sozoiodol Salts.**—**Sozoiodol** is Di-Iodo-Para-Phenolsulphonic Acid, containing iodine 54 p.c., sulphur 7 p.c., and phenol 20 p.c. It combines with **Sodium, Potassium, Ammonium, Lead, Mercury** and **Zinc**, which form odorless substitutes,

21. **Sulphaminol.** *Syn.—Thio-oxy-di-phenylamine.*—A yellow tasteless, odorless, harmless powder, which splits up into sulphur and phenic acid when in contact with the fluids of the body. Useful in laryngeal phthisis and nasal discharges as insufflation. *Dose.*—4 grs. in cystitis.

22. **Thio-Resorcin** and **Di-iodo-thio-Resorcin.**—They are compounds of sulphur and resorcin, and are odorless, non-poisonous amorphous powder. The former is yellowish-white and the latter brown.

23. **Thiuret.**—Is a crystalline derivative of sulphaminol and phenol-sulphonate. Nascent sulphur is given off when in contact with moist surfaces.

24. **Traumatol.** *Syn.—Iodocresol.*—An insoluble odorless substitute containing iodine 54 p.c.

Besides the above, there are many more which are not important.

PHARMACOLOGY.

Externally.—Iodoform is a **deodorant, antiseptic** and **disinfectant** when locally applied, due to the liberation of **nascent iodine**, from its decomposition by many agents, such as living cells, ptomaines, (Binz.) light, and air (oxygen), when in solution in the fats of the body. The decomposition which is essential for liberating iodine does not take place very rapidly. It must not therefore be supposed that when iodoform is applied to a wound iodine is set free so abundantly as to cause local irritation ; but on the contrary iodoform is a **local anæsthetic**.

Internally.—The precise action of iodoform within the body is not well understood. To a certain extent it has the action of iodide. In the stomach, it acts as a **sedative** and **depresses** the **heart** In large doses it produces toxic symptoms. It is eliminated by the **breath** as iodine and by the **urine** as iodides and iodates.

Toxic action.—Acute poisoning is rare now. Chronic poisoning may take place either from repeated doses, or from absorption from a raw surface. The symptoms are malaise, vertigo, dilatation of the pupil, loss of appetite, gastro-intestinal disturbance, quick feeble pulse, fever (temperature sometimes rising to 104 F.), delirium, mania or melancholia, erythema and perhaps eczema, convulsion sometimes, collapse and at times death. Fatty degeneration of the liver and muscles, hæmaturia, and albuminuria may some times occur. These symptoms may come on suddenly, or may develop gradually, lasting for weeks. Moorhof says that poisoning never occurs if iodoform is used alone, and without other antiseptics. The statement is however incorrect. Some persons are peculiarly susceptible to iodoform, and toxic symptoms have occurred after the slightest dusting of the powder upon a small wound.

Treatment of iodoform poisoning.—If iodoform is dissolved in the fats and ptomaines present in a wound, iodine is set free. Its vapor then passes into the body-fluids and is resolved by the *alkaline* serum into five molecules of iodates and one of iodide. In those tissues having an *acid* reaction iodine is again set free and *acts on the tissue on which it is liberated.* The **cerebral cortex**, the **mucous membrane of the stomach**, and the **sweat glands**, all have an *acid* reaction. Hence the cerebral, gastric and cutaneous symptoms in iodoform poisoning and it now appears to be established that by giving 15 grs. of sodii bicarbonate every hour, we can alleviate the symptoms and lessen the ill-effects of the drug. Stimulants, diaphoretics and sponging the skin with warm water are also recommended.

THERAPEUTICS.

Externally.—Iodoform is employed as a local antiseptic, but the strong characteristic smell is the chief drawback to its use. However, it can be disguised by coumarin (50 p. c.) or oil of geranium (1 in 25). Any of the numerous substitutes can be used instead. It is extensively employed in surgery in various forms such as, dusting, collodion, ointment, emulsion, bougie, gauze, wool, &c., in **wounds, sloughing sores, lupus, rodent syphilitic** and **scrofulous ulcers, chancres, bedsores, cancers, ozœna, abscess cavities, sinuses, fistulæ, gonorrhœa, granular lids**, &c. The B. P. ointment may be used in ordinary sores, while 10 to 20 grs. to 10 ozs. in ophthalmia, and 1 to 4 in granular lids. Iodoform soaked in glycerin and water and covered over by cotton wool may be usefully employed in **burns**. The ointment removes **itch**. Collodion iodoform subdues **mumps, buboes** and **chronic glandular enlargements**. The writer uses saturated collodion with great success in these diseases, and also applies it over **neuralgic spots** and **gouty** and **rheumatic joint inflammations**. Iodoform inunction and inhalation have been largely employed in **phthisis**. The suppository is used to relieve painful conditions of the bladder and rectum and the ointment gives great relief in **pruritus ani**. Iodoform (1 to 2 grs. in ether) has been injected into the lungs in **phthisis**, and around tubercular joints (about ½ oz. of a 10 p. c. glycerin emulsion). It may be insufflated for otorrhœa and frequently proves extremely beneficial.

Internally.—It is rarely used internally. As a spray, pastil, or insufflation, it is used in syphilitic sores of the mouth, tubercular pharyngitis and laryngitis. It has been unsuccessfully used in **gastric ulcer** and **phthisis**.

Caution.—The weak and the aged are liable to poisoning. Children bear it well.

Prescribing hints.—Iodoform is rarely used for internal administration. In a mixture or lotion, suspend it with mucilage of acacia. When in pill it is massed with glucose, or ⅙ its weight of pulv. tragacanth co. Its disagreeable odor is covered by eucalyptus and geranium (5 ms. to 2 dr.) oils, balsam of Peru, musk, and coumarin prepared from Tonka beans.

IODUM. Iodine. I.

Source.—A solid non-metallic element obtained from the ashes of seaweeds and sponges and from native iodides and iodates. Hence its old name of "spongia usta." Formerly burnt sponges were largely used in the treatment of tumours without their active principle being understood.

Characters.—Rhombic prisms or octohedrons of a peculiar odor, dark color, metallic lustre, yielding violet vapor on heating. *Solubility.*—1 in 7000 of water, and freely in alcohol 90 p.c., ether, or solution of potassium iodide. *Impurities.*—Water, iron, iodine cyanide.

Identification.—Easy, its peculiar metallic lustre and suffocating odor at once identify it.

Incompatibles.—Mineral acids, metallic salts, vegetable alkaloids, ammonia.

Action.—Antiseptic, rubefacient, lymphatic stimulant, absorbent and alterative.

OFFICIAL PREPARATIONS.

1. **Liquor Iodi Fortis.** *Syn.—Linimentum Iodi.* '85 (altered).—1 in 8½. About 4 times the strength of Tr. Iodine.
2. **Tinctura Iodi.**—1 in 40. **B.P. Dose.**—2 to 5 ms. diluted.
3. **Unguentum Iodi.**—1 in 25. Resolvent, irritant, alterative.

Enters into.—The preparation of Arsenic, Iron, Lead, Mercury, Potassium, Sulphur and Sodium Iodides. Of these, Potassium and Sodium Iodides only will be described here.

NON-OFFICIAL PREPARATIONS.

1. **Glycerinum Iodi. G. H.** or **Iodo-Glycerin Solution.** *Syn.—Morton's Fluid.*—Iodine 10 grs., Pot. Iodide 30 grs., Water 25 ms., Glycerine to 1 oz 30 ms. injected into the sac of a spina bifida.

2. **Iodized Phenol.**—Acid Carbolic and Iodine, equal parts.

3. **Pigmentum Mandl. T. H.**—Iodine 6 grs., Pot. Iodide 20 grs., Ol. Menth. Pip. 5 ms., Glycerin to 1 oz. Granular pharyngitis.

4. **Pigm. Picis c. Iodo.** *Syn.—Coster's Paste.*—Iodine 120 grs., Rectified Oil of Tar 1 oz. Dissolve cautiously by the aid of gentle heat. Useful in ringworm.

5. **Liqr. Iodi. B.P. 1885.** *Syn.—Lugol's Solution.*—Iodine 2, Pot. Iodide 3, Water 40.

6. **Tr. Iodi Decolorata. B.P.C.**—Iodine 250 grs., Rectified Spirit 5½ ozs.; dissolve with a gentle heat, and when cold, add strong solution of Ammonia 10 drs.; keep the mixture in a warm place until decolorised; after which dilute it with Rectified Spirit to 1 pint. Undiluted it may be used as *Tr. Iodi Decolorata Fortior.*

7. **Pasta Amyli Iodidi.**—Starch 1, Glycerin 2, Water 6. Boil together, and add Liq. Iodi B.P. '85, when nearly cold. A good cleanser and healer of sores, especially if syphilitic.

8. **Syrupus Acidi Hydriodici. B.P.C.**—*Dose.*—20 to 60 ms. well diluted.

9. **Vapor Iodi.**—Tr. Iodi 1 dr., Water 1 oz. Apply gentle heat and inhale.

10. **Amylum Iodatum, Iodized Starch.**—Iodine 1, Water q.s. to moisten, powdered Starch 20; Triturate. *Dose.*—½ to 4 drs., rubbed up in milk and water. In syphilis and as an **antidote** to unknown poisons. Externally as a substitute for iodoform.

11. **Iodopyrin** or **Iodantipyrine.**—Colorless, inodorous, tasteless antiseptic powder prepared by mixing iodine and antipyrine. Used in asthma and rheumatism with good results. *Dose.*—5 to 20 grs.

12. **Iodine Trichloride.**—Iodine 50 p.c. A yellow powder prepared by interaction of iodine and chlorine gas. A solution (1 dr. to water 1 gallon) is a powerful antiseptic. In fermentative dyspepsia in ½ oz. doses of the solution.

13. **Iodipyrin** or **Iodipin.**—A yellow, oily, liquid, compound of iodine and *sesame* or *teel* oil. Winternitz considers it more easily assimilable and efficacious than Pot. Iodide. *Dose.*—1 to 4 drs. daily, subcutaneously or by inunction.

14. **Iodo. Caffeine.** *Syn.—Sodium-Caffeine Iodide.*—A white powder. Cardiac tonic and alterative. *Dose.*—5 to 10 grs.

15. **Iodothyrin.** *Syn.—Thyroiodin.*—An active principle containing iodine extracted from the thyroid gland. A powerful alterative.

PHARMACOLOGY.

Externally.—The action of iodine is identical with that of chlorine, but not so energetic. It is a powerful **antiseptic, disinfectant, deodorant** and **antiparasitic**, decomposing organic compounds, and killing germs and parasites. Locally, its action is **irritant, rubefacient** and **vesicant**, according to the strength and length of the application. It stains the skin yellowish-brown and deadens the cuticle which peels off. Iodine dilates local blood vessels and causes exudation of leucocytes, and thus stimulates absorbent vessels. It is a point of practical importance that widespread inflammation of an erysipelatous character may be set up by painting the skin with iodine, especially in children and rheumatic subjects. It may also be absorbed into the circulation when it undergoes the change already described under the head of iodoform, and may, in a similar manner, lead to irritation of any internal organ which has an acid reaction.

Internally. **Gastro-intestinal and respiratory tracts.**—It irritates both. In the stomach and intestines it is slowly converted into iodide or iodate of sodium, but much may be left free to cause vomiting, purging and colic. In minute doses it occasionally stops vomiting. Inhalation of iodine produces **irritation** of the respiratory passages, cough, sneezing, frontal and thoracic pain and dyspnœa.

Remote effects.—For a description of these the student is refered to the pharmacological action of iodoform and the iodides. Nothing further need be said here on these points.

THERAPEUTICS.

Externally.—The chief application of iodine is a local one. The tincture, ointment or liquor is often used to stimulate **foul, indolent** or **lupoid ulcers**, and as a counter-irritant in **sub-acute** and **chronic inflammations** of joints, synovial membranes, lymphatic glands, the pleura, the pericardium, the lungs, liver, spleen, uterus, ovary, periosteum, peritoneum, &c. Tr. Iodi has successfully been injected into **abscesses, sinuses, cysts, hydroceles, bronchoceles, joint-cavities, empyema** and **spina-bifida**. Liquor iodi or linimentum iodi being very strong cannot be painted more than twice, or at the utmost thrice over the same spot. If the application causes much pain and irritation, the iodine can be washed off with alcohol, brandy, whisky or eau de cologne, or better still with a solution of potassium iodide or liqr. potassæ. The liquor or tincture may be painted over the chest to help the absorption of **pleuritic fluid**, and to control the harassing cough and the secretion of chronic **bronchitis** and **phthisis**. Blistering with the strong liquor around or near a threatening **abscess, bubo** or **carbuncle**, lessens their inflammation. Iodine may also be painted over and around the circumjacent skin, to prevent the spread of **erysipelas** and **carbuncle**. Coster's paste is an effective application in **parasitic skin diseases**, such as ringworm, favus and scabies. Iodized phenol is used to cauterize **ulcerated os**, and **uterine cavity** in endometritis. To prevent discoloration of the skin

Tr. Iodi Decolorata may be employed, but it is not so efficient as the B.P. tincture or ointment. Vapor iodi is an efficacious inhalation in **hoarseness, diphtheria** and **phthisis.** To prevent bronchial irritation it is inhaled with chloroform and steam. Iodine lotion (Iodine 21 ozs., Pot. Iodide 2 grs., water 1 oz.) removes **opacity of the cornea** when it is of recent origin and does not involve the cornea to any depth.

Internally.—Free iodine is rarely used. Tr. iodine painted over the gums and teeth **dissolves tartar**, heals ulcers and stimulates the **growth** of **gums**, when they have ulcerated and receded. Iodine gargle (2 to 4 drs. in water 8 ozs.) checks **mercurial salivation**, and heals **syphilitic** and **non-syphilitic sores** of the mouth and throat. Pigmentum Mandl is a capital application for **chronic granular pharyngitis**. Tr. iodi 1 or 2 drops in 1 oz. of water at times checks vomiting, when given every ¼ hour. Iodine is recommended in **scrofula, malarial fever** and **gout** with varying success. The writer has used tincture iodine in chronic malarial fever with and without enlarged spleen without appreciable benefit. Sometimes iodine does good in **syphilis** and **scrofula**, where its salts fail.

Caution.—As iodine is a gastro-intestinal irritant, it should be freely diluted and administered after food. In the stomach it is converted into **iodide of starch**, which is less irritant (see Amylum Iodatum). Trousseau gives the tincture in sugared water or in sherry.

POTASSII IODIDUM. Potassium Iodide. KI.

Source.—(1) Dissolve iodine in a solution of potassium hydroxide and evaporate to dryness; $6KHO + 3I_2 = 5KI + KIO_3 + 3H_2O$. (2) Mix the residue with charcoal and heat, thereby to remove the oxygen of iodate as carbonic oxide; $2KIO_3 + 6C = 2KI + 3CO_2$. (3) Dissolve and purify.

Characters.—Colorless, opaque, cubic crystals with a feebly alkaline reaction. *Solubility.*—4 in 3 of water, 1 in 10 of alcohol 90 p. c. and 1 in 3 of glycerin. *Impurities.*—Iodates, bromides, cyanides, nitrates, &c.

Incompatibles.—Bismuth subnitrates and sp. æther. nitrosi.

Action.—Alterative, resolvent, expectorant, diuretic. **B.P. Dose.**—5 to 20 grs. in solution or pill.

Enters into.—Liqr. Iodi Fort. (26¾ grs. nearly), Tr. Iodi (10 grs. nearly), Ung. Iodi (17½grs). and the

OFFICIAL PREPARATIONS.

1. **Linimentum Potassii Iodidi cum Sapone.**—1 in 10 by wt. A creamy unirritating alterative and resolvent substance, not staining the skin.

2. **Unguentum Potassii Iodidi.**—1 in 10. White; acting in the same way as the above.

SODIUM IODIDUM. Sodium Iodide. NaI.

Source.—Prepared from iodine and sodium hydroxide by a process similar to that adopted in making potassium iodide ; the salt being crystallised at a temperature of not less than 68°F.

Characters.—A dry white crystalline deliquescent powder having a saline and somewhat bitter taste. *Solubility.*—1 in 6 of water, 1 in 3 of alcohol 90 p. c. *Impurities.*—The same as of potassium iodide.

Action.—The same as of potassium iodide, but more assimilable and less depressing. **B.P. Dose.**—5 to 20 grs.

NON-OFFICIAL IODINE SALTS.

1. **Ammonii Iodidum.**—A whitish deliquescent salt, becoming yellow from exposure to air (shaking the mixture with a piece of ammon. carb. removes the color). Freely soluble in water. **Action.**—The same as sodium iodide. *Dose.*—3 to 20 grs.

2. **Rubidii Iodidum.**—In colorless cubic crystals soluble in water. **Action.**—Less depressant and better tolerated by the stomach than potassium iodide. *Dose.*—5 to 20 grs.

3. **Strontii Iodidum.**—White crystalline mass. Dose and action as of Rubidii Iodidum.

PHARMACOLOGY OF IODIDES.

Externally.—Potassium and sodium iodides are freely absorbed, being decomposed by the sweat.

Internally.—The action of the salts of iodine is identical with that of iodine, except that they are less irritant to the gastro-intestinal canal, and are therefore used in preference to iodine. Of these again, potassium iodide is largely employed. In minute doses it improves appetite and body weight of healthy individuals. It is quickly absorbed and is converted into sodium iodide : this again is slowly decomposed by small quantities of nascent oxygen (set free by living protoplasm) acting upon the iodide in an acidulated solution, the acid being provided either by carbonic acid in the blood, or the acid secretions of different organs. In large doses it produces a group of symptoms, known as "**Iodism.**" Besides the characteristic action of iodine, it has a certain definite action of its own. It increases the secretion of bronchial glands during its elimination through the respiratory mucous membrane, producing a flow of thin mucus, and liquefying tenacious secretions ; hence it is an **expectorant.** It is also an indirect **antispasmodic.** In large doses, it causes **diuresis**, but how far this diuretic action is due to the large doses of alkali, or to the iodine, is not known. Large doses of the salt (10 grs.) **lessen** the secretion of **milk**, produce **atrophy** of **mammæ** and **testicles**, and destroy **sexual power.** Potassium iodide, or at least the iodine, disengages certain metallic poisons, such as mercury and lead, from their albuminous compounds, forms soluble salts, and removes them from the tissues. It has a specific effect on **syphilitic virus**, but how this is affected is not known.

Elimination.—Iodides are rapidly eliminated by the mucous membranes, especially those of the air-passages, urine, saliva, mammæ and sweat glands. In escaping through the skin it produces **cutaneous eruptions** starting from the orifices of the sweat glands. This is due to the liberation of nascent iodine as already described.

Iodism.—Some individuals are very susceptible to its influence, even ½ to 1 gr. producing symptoms of iodism; while others can bear much larger quantities (1 to 4 drs. daily). The characteristic symptoms of iodism are running of the eyes and nose, sneezing, œdema around the eyes, frontal headache, brassytaste in the mouth, loss of appetite, with irritation of the fauces and trachea. These grow intense if the iodides are pushed, leading to swollen gums, furred tongue, salivation, and in some cases, vomiting, diarrhœa, bronchitis and cutaneous eruptions.

Antidotes.—Carbonate of ammonia, sp. ammon. aromat. or bicarbonate of potassium controls iodism. Fowler's solution prevents skin eruptions.

Therapeutics of Iodides.

Externally.—The liniment and ointment of pot. iodide are used for the same purposes as the preparations of iodine, with this advantage, that they neither stain nor irritate the skin, but they are decidedly weaker.

Internally.—Iodides are employed in the same class of diseases where iodine is indicated either internally or externally; but the following deserve a special notice :—

1. **Stomach and Liver.**—Potassium iodide given after food, in minute doses say ½ gr. with aromatic spirit of ammonia or ipecacuanha wine is of great service in **atonic dyspepsia**. It is said to do good to **cirrhosis** of the **liver** in its early stage.

2. **Respiratory passage.**—Pot. iodide 10 grs. given at bedtime cuts short an attack of acute **cold in the head** at the outset, so also chronic cold in small doses. In acute **febrile catarrh**, it is serviceable when given with antimonial wine. It relieves **asthma** (15 to 20 grs.) whether dependent on cold or not. In **bronchitis**, it liquefies the phlegm and helps expectoration; and in **pneumonia** and **pleurisy**, helps the absorption of effused products

3. **Heart and blood vessels.**—It is useful for absorbing the effusion in **pericarditis**, and the deposits over the **cardiac valves**. In **mitral regurgitation** and **aortic obstruction**, the writer obtained excellent results from protracted use. **Internal aneurysms** with varying pains, are materially benefited by large doses (20 grs. and upwards) of potassium iodide. Here, it acts by reducing the blood-pressure, increasing the coagulability of the blood and influencing the arterial coats. Beneficial effects

have been obtained in **angina**, when given in the interval between attacks.

4 **Lymphatic glands.**—Iodides together with the local application of iodine, reduce the size of chronic enlargements of lymphatic glands, scrofulous or otherwise.

5. **Kidney.**—Occasionally potassium iodide acts as a powerful diuretic in **Bright's disease** and removes the anasarca wonderfully, but it has little influence on the total amount of albumen.

6. **Brain.**—Many authorities recommend the use of pot. iodide in **hydrocephalus**, but it only acts as a palliative.

7. **Skin.**—Many syphilitic cutaneous diseases, such as **psoriasis** and **erythema**, are sometimes cured by full doses of iodides.

8. **Scrofula**—The iodides, especially Syr. Ferri Iodidi alone or with codliver oil, have a remarkable effect in **tuberculosis**, when the glands are affected ; but they have little effect on the tubercles of the lungs unless they are syphilitic.

9. **Syphilis**—What mercury is in the primary and secondary stage, iodides are in the tertiary. Under its use **periostitis**, **nodes**, **gummata**, syphilitic **deposits** in the **brain** and other organs disappear with remarkable rapidity. The success depends upon boldly pushing the drug in 20 to 40 grs., 3 or 4 times a day. In secondary syphilis even, it sometimes does great good when combined with corrosive sublimate. It cures barrenness of women due to syphilis. In congenital syphilis, the iodides are also efficacious, but the system becomes less tolerant, after the poison is destroyed. In primary syphilis they have no effect.

10. **Metallic poisons.**—Pot. Iodide eliminates lead and mercury from the system, magnesii sulphas should always be given in these cases in combination with the iodide, otherwise the metallic salt may be reabsorbed from the bowels. During elimination, mercury may cause salivation Some authorities recommend this salt in mercurial salivation, but there is a chance of salivation being increased by it, as it is a sialagogue itself.

11. **Rheumatism.**—**Chronic rheumatism, gonorrhœal rheumatism, rheumatic arthritis** and **chronic gout** always yield to iodides, especially the two former. Pains resembling rheumatism and increasing at night whether due to syphilis or not are removed very quickly by them.

The action of sodium iodide is similar to that of potassium iodide though not much used. Ammonium and rubidium iodides are less depressant.

Prescribing hints.—Remember that small doses of iodide will often cause iodism whereas large ones will not. By administering the drug in milk large doses can be given with impunity. Ammonium carbonate or potassium bicarb. also checks the symptom of iodism. See also page 82 and 89.

IPECACUANHÆ RADIX. Ipecacuanha Root.

N. O. *Rubiaceæ.*

Syn.—Hippo. **Habitat.**—Brazil.

Source.—The dried root of *Psychoiria Ipecacuanha.*

Characters.—Tortuous pieces, up to 6 in. long, and ¾ in. thick, color dark brick-red or brown, closely annulated. Fractured surface, exhibits a greyish, resinous or starchy cortex, and a dense central portion. Odor slight. Taste bitter. The Carthagena variety (unofficial) is thicker, with annulations less marked. *Impurities.*—Hemidesmus root, cracks, not annulated ; almond powder with Pulv. Ipecac, known by its prussic acid odor when moistened.

Identification.—The bead-like and ringed appearance is peculiar and characteristic of ipecacuanha. Note its color and section.

Composition.—(1) *Emetine,* 1·45 p. c. (2) *Cephaeline,* 0·52 p. c. (3) An unnamed third alkaloid, 0·04 p.c. The total alkaloids therefore being 2·01 p. c. (4) Ipecacuanhic or cephaelic acid. (5) Starch, volatile oil, gum, &c.

B.P. Dose.—¼ to 2 grs. as an expectorant, and 15 to 30 grs. as an emetic. For a child 1 year old $\frac{1}{12}$ to ¼ gr. as an expectorant, and 2 to 4 grs. as an emetic.

OFFICIAL PREPARATIONS.

1. **Acetum Ipecacuanhæ** (altered). **B.P. Dose.**—10 to 30 ms.
2. **Extractum Ipecacuanhæ Liquidum** (new).—2 to 2¼ grs. alkaloids in 110 ms. **B.P. Dose.**—½ to 2 ms. as an expectorant, 15 to 20 ms. as an emetic.
3. **Pilula Ipecacuanhæ C. Scilla.**—1 in 20. Opium 5 p.c. **B.P Dose.**—4 to 8 grs.
4. **Pil. Ipecac. C. Urginea.** (*Ind. and Col. Addendum*).—Compound Ipecac Powder 3, Urginea 1, Ammoniacum 1, Syr. Glucose *q. s.* Opium 1 in 20. **B.P. Dose.**—4 to 8 grs.
5. **Pulvis Ipecacuanhæ Comp.** *Syn.—Dover's Powder.*—Ipecac. 1 opium 1 in 10. Fawn colored. Diaphoretic, anodyne. **B.P. Dose.**—5 to 15 grs.
6. **Trochiscus Ipecacuanhæ.**—¼ gr. in each.
7. **Troch. Morphinæ et Ipecacuanhæ.**—$\frac{1}{36}$ gr. morph. and $\frac{1}{12}$ gr. ipecac. Acts like Dover's powder.
8. **Vinum Ipecacuanhæ** (altered). **B.P. Dose.**—10 to 30 ms. as an expectorant, 4 to 6 drs. as an emetic, 1 dr. as an emetic for a child 1 year old.

NON-OFFICIAL PREPARATIONS.

1. **Pulvis Ipecac Sine Emetina, De-emetized Ipecacuanhæ.**—Said to be equally efficacious in dysentery without causing vomiting. *Dose.*—10 to 30 grs.
2. **Syrupus Ipecacuanhæ.**—Ipecac 1, Alcohol 90 p. c. 5, Water 40, digest 48 hours, filter 40. add Sugar 60 to make 100.
3. **Syr. Ipecac. Aceticus. B.P.C.**—Acetum Ipecac. 1 pint, Sugar 2¼ lb., dissolve by gentle heat. *Dose.*—¼ to 2 drs.
4. **Tinctura Ipecacuanhæ.**—Ipecac 1, Alcohol 60 p.c. 10 ; digest 8 days, make up to 10.

5. **Emetine Hydrochloride** and **Emetine Hydrobromide**.—In silky filament. *Dose.*—$\frac{1}{60}$ to $\frac{1}{20}$ gr. (expectorant); $\frac{1}{6}$ to $\frac{1}{3}$ gr. (emetic). Emet. Hydrochlor. 1 gr. in sherry 8 ozs., makes **Vinum Emetinæ** of the same strength as Vin. Ipecac. Powerful expectorant and emetic.

6. **Cephaeline Hydrochloride**.—In colorless crystals. More powerful emetic than emetine. *Dose.*—$\frac{1}{12}$ to $\frac{1}{4}$ gr.

PHARMACOLOGY.

Externally.—Powdered ipecacuanha acts as an **irritant, rubefacient** and **pustulant** on the unbroken skin. Inhaled it produces irritation of the eyes and nose, sneezing, bronchial secretion, leading sometimes to asthma. It kills anthrax bacilli.

Internally **Alimentary canal and liver.**—It has a nasty bitter taste and excites flow of saliva. In small doses, ¼ to ½ gr., it increases the secretion of the gastric juice by stimulating the local circulation, and is therefore **stomachic** and **tonic.** In large doses it creates nausea with secretion of mucus. In larger doses, 15 to 30 grs., it produces vomiting, partly by its direct influence on the peripheral ends of the pneumogastric, and partly by stimulating the vomiting centre; hence it is a **direct** and **indirect emetic** (see page 127). This indirect emesis can be produced by injecting emetine or cephaeline after cutting the pneumogastric. The vomiting is slow but certain and is unaccompanied by much nausea or prostration. In drop doses ipecacuanha wine acts as an **antiemetic**, in certain conditions.

Large doses no doubt **irritate** the **intestines**, causing hyperæmia, stimulation of the glands and peristalsis, hence there is a considerable amount of secretion leading to purging.

The **liver** is **directly stimulated** by the alkaloids of ipecacuanha and there is a plentiful secretion of bile, therefore ipecacuanha is a **direct cholagogue** (see page 130).

Heart and blood.—Emetine and cephaeline are absorbed into the blood from the mucous membranes, and excreted by them, especially those of the respiratory tract, stomach, and intestines. They have no definite action on the blood. They depress the heart in larger doses.

Respiratory tract.—During elimination, ipecacuanha powerfully stimulates the bronchial mucous membrane, causing hyperæmia, and **increasing its secretion**; consequently it is an **expectorant.** Rossbach has demonstrated that emetine increases the tracheal secretion like apomorphine.

Skin.—Moderate doses (½ to 1 gr.) stimulate the skin and produce **diaphoresis**, which action is increased by the combinination with opium (Dover's powder).

THERAPEUTICS.

Externally.—Ipecacuanha is rarely used, though recommended in anthrax. Applied as a paste it allays the pain of wasp and hornet stings.

Internally. **Alimentary canal.**—As a stomachic tonic, powdered ipecacuanha ($\frac{1}{4}$ to $\frac{1}{2}$ gr.) is used with other stomachics and bitters in **atonic dyspepsia.** Ipecacuanha wine in 1 m. doses every $\frac{1}{4}$ or $\frac{1}{2}$ hour remarkably checks the **vomiting of pregnancy, alcoholism, migraine** and **gastric irritability** during febrile attacks and other diseases. In cases where it fails, the writer combines it with $\frac{1}{4}$ m. of dilute hydrocyanic acid with good results; ipecacuanha is not a suitable emetic in **poisoning** as its action is tardy, but is exceedingly efficacious in **croup** and **bronchitis** of children, not only by mechanically expelling the mucus, but by its influence on the respiratory mucous membrane The subsequent depression is highly beneficial. 1 to 2 drs. of the wine must be given every 1 or 2 hours until the child vomits. With some it merely acts as a purgative. It makes an excellent emetic in bilious attacks and in the early stage of fevers. The compound powder sometimes gives good results in **gastric ulcers.**

Powdered ipecacuanha in 20, 30 or even 60 or 90 grs. cures **acute dysentery,** but how it does this is not known. Some patients can retain such large doses, while others cannot. To prevent its being rejected, it is better to give an opium draught, or a hypodermic injection of morphine an hour before the administration of the drug. Keep the patient in a recumbent position, and allow no water or food for at least four hours afterwards. If it is brought up even then, it can be injected per rectum, suspended in mucilage, with 15 to 20 ms. of liquid extract of opium. De-emetized ipecacuanha (Merck) may be usefully employed, but is not so efficient as the powdered root In subacute and chronic cases and **diarrhœa,** Dover's powder acts well. The **dysenteric diarrhœa** of children, acute or chronic, generally yields to drop doses of ipecacuanha wine (Ringer)

It is a most effective remedy for **catarrhal jaundice** and **torpidity of the liver,** when given alone or combined with other cholagogues. The writer cured a few cases of such jaundice with ipecacuanha and gentian pills. It is a favourite constituent of aperient and cathartic pills.

Respiratory passages.—As an expectorant, ipecacuanha in the form of wine, acetum, liquid extract, lozenge or syrup, is being daily used in colds, catarrhs, acute and chronic bronchitis and broncho-pneumonia The inhalation of ipecacuanha spray benefits **winter cough, bronchial asthma, bronchitis** *accompanied by dyspnœa* and bronchitis of old emphysematous persons. It is worth trying in suitable cases. Ipecacuanha is also recommended in **hay asthma** and **whooping cough** In **acute pneumonia,** large doses have been given with success.

In nauseating doses, it is recommended in **hæmoptysis** and hæmorrhages from other organs, but it has no specific influence over them, beyond depressing the circulation.

ISPAGHULA. Spogel Seeds. N.O. *Plantageneæ.* (*Ind. and Col. Addendum*).

Syn. I. V.—*Isupgul*, Beng., Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried seeds of *Plantago ovata.*

Characters.—About $\frac{1}{10}$ in. long and $\frac{1}{20}$ in. wide. Ovate elliptical, boat-shaped, pinkish ; the convex side bearing a dark spot.

Composition.—(1) *Mucilage*, 1 in 20 of water forms a thick tasteless jelly. (2) *Fatty oil* and albuminous matter.

Action.—Demulcent, mild astringent. **B.P. Dose.**—50 to 150 grs.

OFFICIAL PREPARATION.

1. **Decoctum Ispaghulæ.**—13·7 of seeds to 1000 of water. **B.P. Dose.**—$\frac{1}{2}$ to 2 ozs.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The bruised seeds, moistened with water, form an excellent emollient poultice, and can be used for the same purposes as linseed. When made with vinegar and oil they are applied over rheumatic and gouty swellings.

Internally.—Ispaghul has long been known and used by the people of India as a remedy for **diarrhœa** and **dysentery**. Its beneficial effects are more marked in the chronic stages. Many cases of inflammatory diarrhœa and dysentery yield to its use when other remedies fail. It is supposed to form a protective layer of mucilage over the inflamed parts of the intestinal mucous membrane. It is generally taken, in these cases, alone with water (1 in 40) when it forms a mucilaginous mass. Many of the swollen seeds pass out with the motions, and their action is supposed to be mechanical as well as astringent over the intestinal ulcers. The writer often combines it with bruised *kurchee seeds* (*Wrightia antidysenterica*), commonly known as "*Indrajab*," the dose is five grs every two or three hours, and this combination will be found to yield most encouraging results. The decoction is also used as a demulcent in **cough** and **sore-throat**, and formed into a *shurbet* (seeds, sugar and water) it is largely used as a cooling beverage in **gonorrhœa** when it acts as a mild diuretic and soothes the irritation of the urethra during micturation.

The mucilage exists in the covering of the seeds only, and a decorticated preparation, known as "*Isuphghul ka chilka*" can be obtained from any *pansari's* shop. This preparation should be used if there is any fear of irritation of intestinal ulcers from the seeds.

The remedy is tasteless and is well suited both to adults and children

JABORANDI FOLIA.

Jaborandi Leaves. N.O. *Rutaceæ.*

Syn.—Pilocarpi Foliola.

Habitat—Brazil (Pernambuco).

Source.—The dried leaflets of *Pilocarpus Jaborandi.*

Characters.—Dull green, oval-oblong or oblong-lanceolate, 2½ to 4 in. long, shortly petiolate, obtuse and emarginate apex, unequal base, entire revolute margin, coriacious texture. Mature leaflets glabrous with prominent veinlets on the upper and scattered hairs on the under surface. Odor aromatic when bruised. Taste at first bitter aromatic, afterwards pungent, increasing flow of saliva. *Impurities.*—Leaves of several species of *piper.* In Brazil these are all known as jaborandi.

Identification.—The prominent midrib and translucent dots with the *emarginate apex* at once distinguish it. Mark its shape and color.

Composition.—(1) *Pilocarpine,* the chief alkaloid, is a colorless liquid. (2) *Jaborine* (isomeric) antagonistic to pilocarpine and resembling atropine in action. (3) *Pilocarpidine.* (4) *Jaboridine.* The last two are probably oxidation products of pilocarpine and jaborine, and acting also respectively like them

Action.—Sialagogue, diaphoretic and expectorant.

OFFICIAL PREPARATIONS.

1. **Extractum Jaborandi liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Tinctura Jaborandi.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Infusum Jaborandi.**—½ oz. to 10 ozs. of boiling water for ½ hour. *Dose.*—1 to 2 ozs.

PILOCARPINÆ NITRAS.

Pilocarpine Nitrate. $C_{11}H_{16}N_2O_2, HNO_3$.

Source and **Characters.**—The nitrate of an alkaloid obtained from jaborandi leaves, in white crystalline powder, soluble in 8 or 9 parts of cold water, and slightly in alcohol (90 p.c.). **B.P. Dose.**—$\frac{1}{20}$ to ½ gr.

NON-OFFICIAL PREPARATIONS.

1. **Pilocarpinæ Hydrochloridum.**—Minute, white deliquescent crystals. *Dose.*—$\frac{1}{20}$ to ½ gr.
2. **Guttæ Pilocarpinæ.**—Pilocarpine Nitrate 2 grs., Water 1 oz. Myotic.
3. **Pilocarpine Hair Lotion.**—Pilocarpine nitrate 2 grs., Quinine murias 8 grs., Glycerin 2 drs., Aqua Rosæ 6 drs. Mix.
4. **Pilocarpinæ Phenas, Pilocarpine Carbolate.**—A colorless oily liquid soluble in water and alcohol. A solution 1 gr. in 10 ozs. of 2·75 p.c. of phenol solution, is called **Aseptoline,** an American speciality, and is used in intermittent fever and phthisis in 1 fl. dr. hypodermically.
5. **Pilocarpinæ Salicylas.**—Small colorless tabular crystalline powder. *Dose.*—$\frac{1}{20}$ to ½ gr.

6. **Unguentum Pilocarpinæ.**—Pilocarpine Nitrate 4 grs., Vaseline ½ oz., Lanoline ½ oz. Stimulates the growth of hair.

PHARMACOLOGY.

Jaborandi in many respects resembles physostigma in action (see Physostigma).

Externally.—Pilocarpine **contracts the pupil** by stimulating the terminal ends of the third nerve, causing tension of accommodation, and disturbance of vision.

Internally.—Pilocarpine readily enters the circulation and is carried to different structures, where it produces definite effects, which are described below under separate heads :—

Digestive apparatus.—Within about 10 minutes after administration, jaborandi produces a copious secretion of saliva of almost normal composition, by directly stimulating the peripheral ends of the nerves supplying the salivary glandular cells and partly the salivary nerve centre. Therefore it is a **powerful sialagogue**, (see page 123), the secretion amounting to a pint and a half at times. The salivation is immediately stopped by injection of atropine. The peristaltic movements of the unstriped muscles of the gastro-intestinal canal are increased owing to direct stimulation of the solar plexus. The muscular coat of the intestine is not affected by pilocarpine. The gastric juice and intestinal secretion are also increased. The **biliary secretion** is **unaffected**, but the **spleen contracts**.

Skin —The next important action is on the skin. Within 6 to 10 minutes after the hypodermic injection of pilocarpine nitrate (¼ to ⅓ gr.) the face, neck and ears become flushed, and drops of perspiration appear upon them, soon extending over to the whole surface. The sweating is so profuse as to soak garments and bed clothes, 15 to 20 ozs. may thus be excreted by one diaphoresis. Therefore it is a **powerful sudorific** (see page 148). This action is due to the stimulation of the nerve terminations in the glandular cells. It also stimulates the growth of hairs, and makes them coarse and black.

Circulatory apparatus.—Both the heart and pulse are accelerated at first, but are soon slowed and depressed The vessels first dilate ; and the blood pressure falls temporarily, but rises again, and finally falls. Atropine counteracts the slowing of the pulse, but it cannot do so if the vagus is cut ; thus showing that pilocarpine depresses the heart by stimulating the peripheral terminations of the vagus in the heart.

Respiratory passages.—Jaborandi increases both the nasal and bronchial secretions.

Eyes and ears.—Locally applied, or given by the mouth or subcutaneously, it causes contraction of the pupil. It increases the flow of tears and secretion of cerumen. This contraction of the pupils, which is prevented by the previous use of atropine, is due to stimulation of the endings of the oculo-motor nerve. There is no stimulation of the sphincter muscle itself and the action of the drug in this respect differs from that of physostigmine.

Urinary tract.—Very small doses, frequently repeated, no doubt increase the **flow of urine**, but it is diminished when the sweating is copious. Pilocarpine is eliminated with the urine. Urea is said to be excreted both in the saliva and sweat. By its contractile effect on the **bladder**, it causes suprapubic pain and irresistible desire to pass water.

Body heat and weight.—On account of the excitement of the cutaneous circulation before sweating, there is a slight rise of temperature, but it soon falls during sweating. There is also a reduction of body weight to the extent of 7 pounds or more.

Female generative organs.—Pilocarpine contracts the uterine muscles, sometimes to such an extent as to cause abortion. It also increases uterine and vaginal mucus, and promotes secretion of milk.

Summary of actions.—It will be observed that pilocarpine performs **two** most important specific functions, viz. :—(1) The **stimulation of secretion**, (2) the **contraction of the involuntary muscular fibres** due to stimulation of the nerve endings and not to that of the muscular fibres themselves. Of these, **salivation, diaphoresis** and **myosis** are most marked. Children are less affected than adults.

Antagonists.—Belladonna and atropine. $\frac{1}{150}$ gr. of atropine given subcutaneously arrests profuse salivation and diaphoresis within 5 to 10 minutes.

THERAPEUTICS.

Externally.—To promote the growth of hair, pilocarpine is largely employed in the form of a hair-lotion. In ophthalmic practice, it has been locally applied in **iritis, retinitis, detachment of the retina, glaucoma**, &c., but it is less active than physostigmine, and its effects more transitory.

Internally.—Pilocarpine has been used in all sorts of diseases, but is now chiefly employed for its diaphoretic action in **uræmia** and **convulsions**, where it may be the agent of saving life by the elimination of urea and other products through perspiration. It is of special service in **Bright's disease**. Pilocarpine, in small doses, or the liquid extract (10 ms.) increases diuresis, reduces albumen and blood, and moistens the mouth. When there are **anasarca** and **serous effusions**, $\frac{1}{6}$ to $\frac{1}{4}$ gr. of pilocarpine nitrate produces profuse sweating and salivation, thereby relieving the water-logged system The diaphoresis can be helped by wrapping the patient in warm blankets, and giving him warm drinks It has been used in **bronchitis, pertussis, asthma, diphtheria, laryngitis, tonsillitis, diabetes, amenorrhœa, uterine diseases, hydrophobia, myxædema**, &c.

with varying results. Ringer considers pilocarpine when given in $\frac{1}{20}$ gr. doses three times a day, an efficient drug for checking excessive perspiration, as in phthisis. For its antagonistic properties it is used in poisoning by belladonna. Josham considers that $\frac{1}{3}$ gr. subcutaneously injected has a remarkable effect in **calming drunkards.** In **alopecia, prurigo, urticaria** it has been given with some benefit. Patients suffering from **deafness,** due to **disease of the auditory nerve,** are sometimes benefited by pilocarpine.

Caution —Sometimes alarming prostration and collapse may follow the hypodermic injection of $\frac{1}{4}$ gr. ; and atropine should at once be injected. It should be used with great caution in valvular diseases of the heart, fatty heart, emphysema, pleurisy, and the patient watched. Children are less affected than adults.

JALAPA. Jalap. N.O. *Convolvulaceæ.*

Habitat.—Mexico.

Source.—The dried tubercules of *Ipomœa purga.*

Characters.—Dark brown ; oblong, ovoid or fusiform roots ; 1 to 3 in. long ; larger ones incised ; hard, compact, and heavy. Externally furrowed, wrinkled, with small transverse scars. Internally yellowish-grey or dingy brown. Section exhibits irregular concentric lines. Odor characteristic. Taste sweet at first, acrid and disagreeable afterwards.

Identification.—Most easily identified, its appearance is very characteristic. It is distinguished even in powder as its smoky odor and brown color are very peculiar.

Composition.—(1)*Resin* (*off*) 9 to 11 p.c., which again is composed of two glucosides, (*a*) *Convolvulin, insoluble in ether*, (*b*) *Jalapin, soluble in ether.* It must be noted that the term *Jalapin* has been applied to the resin of *Spurious Jalap*, which is similar to the *true* resin of scammony. The nomenclature is misleading.

Action.—Hydragogue purgative. **B.P. Dose.**—5 to 20 grs. in cachets or in confection.

Enters into.—Pulv. Scammon. Co. and the

Official Preparations.

1. **Extractum Jalapæ.**—A dark-brown extract. **B.P. Dose.**—2 to 8 grs. in pill.
2. **Pulvis Jalapæ Compositus.**—1 in 3. Like Dover's powder in appearance. **B P. Dose**—20 to 60 grs. in cachets or confection.
3. **Tinctura Jalapæ.**—1½ p.c. resin. A deep-brown liquid. **B.P. Dose.**—½ to 1 dr.
4. **Tintura Jalapæ Co** (*Ind. and Col. Addendum.*).—Jalap 262 grs., Scammony 175 grs., Turpeth 88 grs., Alcohol *q.s.* to 1 pint by percolation. For use in Indian and Australasian Colonies.

JALAPÆ RESINA. Jalap Resin.

Source and Characters.—A dark-brown, opaque, brittle extract obtained from jalap, readily soluble in alcohol 90 p.c., not in water. Taste acrid.

Resembles.—Aloes, which is bitter,

Enters into.—Pilula Scammonii Compositus. **B.P. Dose.**—2 to 5 grs.

NON-OFFICIAL PREPARATION.

1. **Sapo Jalapinus.**—Resin 4, Soap 4, Alcohol 8 by weight. Evaporate to 9.

PHARMACOLOGY.

Internally.—Jalap closely resembles scammony in actions with this difference, that (1) it is **less irritant** and **contracts less** violently the intestinal muscular fibres, and therefore causes less griping ; and (2) it produce a **greater stimulation** of the intestinal glands, and is therefore **more hydragogue.** It does not purge unless in contact with the bile. *Small doses* have a **laxative** effect, but large ones produce several watery stools attended with pain and griping. Its action is entirely local, for it does not purge when subcutaneously injected. It has a feeble **cholagogue action.**

THERAPEUTICS.

Internally.—Being a **hydragogue purgative,** Pulv. Jalap. Co. is employed in drawing off water in **dropsy, ascites, anasarca** : from whatever causes they may arise. It is also used in **obstinate constipation,** and as a **revulsant** in **congestion** of the **brain, apoplexy,** and **engorgement** of the **right heart.** Jalap is an excellent purgative in **Bright's disease** and **uræmia.** The resin in small doses can be given in **habitual constipation.** It should not be prescribed where the bowels are inflamed or liable to inflammation.

JUNIPERI OLEUM. Oil of Juniper. N. O. *Coniferæ.*

Syn. I. V.—*Aarar Ká tel*, Hindi *Hab-ul-arar*, *Ka tel*, Bomb :

Habitat.—North of Europe and North-west Himalaya.

Source.—The oil distilled from the full-grown unripe green fruit of *Juniperus communis.*

Characters.—Colorless or pale-greenish yellow ; odor characteristic ; taste aromatic bitter. Sp. gr. 0·865 to 0·890. *Solubility.*—1 in 20 of alcohol 90 p.c.

Composition.—Contains (1) a hydrocarbon *Terpene* ($C_{10} H_{16}$) isomeric with oil of turpentine and which by contact with water yields a white crystalline hydrous compound $C_{10} H_{16} H_{20}$; (2) *Polymeric hydrocarbon* ($C_{20} H_{22}$).

Action.—Stimulating diuretic, carminative, and antispasmodic. **B.P. Dose.**—½ to 3 ms.

OFFICIAL PREPARATION.

1. **Spiritus Juniperi.**—1 in 20. If not clear shake with powdered talc and filter. **B. P. Dose.**—20 to 60 ms. *Enters into.*—Mistura Creosoti.

PHARMACOLOGY.

Internally.—Oil of juniper resembles oil of turpentine in its action, but it is a more powerful **renal stimulant** and **diuretic**, and is more agreeable to the stomach. In large doses, it **excites genital organs** like cantharides, causing strangury and priapism. It is absorbed into the blood and is excreted with the urine, to which it imparts an odor of violets. The diuretic effect is observed in dropsy, whilst in health it is said to diminish the urine secreted.

THERAPEUTICS.

Internally.—Sometimes it is used as a stomachic, stimulant and antispasmodic, but it is chiefly employed as a diuretic in **cardiac** and **hepatic dropsy**, and in some forms of **chronic Brights' disease**. It should not be used in acute renal affections. It is best given with salines. Gin and Hollands contain it and they can be used as alcoholic beverages in the above diseases.

KALADANA. Kaladana. N O. *Convolvulaceæ.*

(Ind. and Col. Addendum.)

Syn. B.P.—Pharbitis Nil. **Syn. I. V.**—*Kalá daná*, Beng., Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried seeds of *Ipomœa hederacœa.*

Characters.—$\frac{3}{16}$ in. long and wide, in segments of spheres. Black throughout, brown and hairy only at the hilum. Taste sweetish at first, then acrid.

Composition.—*Pharbitisin,* a resin, about 8 p.c. It resembles the resin of jalap, (*convolvulin*), and corresponds to it in chemical properties.

Action.—Mild purgative. **B.P. Dose.**—30 to 50 grs. in powder.

OFFICIAL PREPARATIONS.

1. **Pulvis kaladanæ Co.**—Kaladana 5, Acid Pot. Tartrate 9, Ginger 1. **B.P. Dose.**—20 to 60 grs.
2. **Tinctura Kaladanæ.**—1 in 5 of alcohol (70 p.c.). **B.P. Dose.**—½ to 1 dr.

KALADANÆ RESINA. Kaladana Resin.

Source and **Characters.**—A resin obtained from kaladana seeds. In brownish opaque fragments translucent at the edges; brittle, breaking with a resinous fracture, of a disagreeable odor, specially when warmed.

B.P. Dose.—2 to 8 grs.

PHARMACOLOGY AND THERAPEUTICS.

The action and uses of kaladana and its resin are the same as those of jalap (q.v), but it is a milder remedy In small doses it is a gentle purgative, but in larger ones, especially in the form of Pulv. Kaladanæ Co. it has a drastic action and can therefore be used with benefit as a derivative in all cases of dropsy.

KAOLINUM. Kaolin.

Source.—A native aluminium silicate, powdered, and freed from gritty particles by elutriation,

Characters.—A soft whitish powder insoluble in water or in dilute acids.

Enters into.—Pilula phosphoricum.

NON-OFFICIAL PREPARATION.

1. **Ung. Kaolini.**—Vaseline 1, Hard Paraffin 1, melt, and add Kaolin 1 ; stir till cold. An emollient application to abraded surface, and a useful excipient for silver nitrate, potassium permanganate and bichromate pills (See page 86.).

Uses.

Besides its use as an **excipient**, it can be employed as a dusting powder in **intertrigo, weeping eczema**, &c.

KAVÆ RHIZOMA. Kava Rhizome. N. O. *Piperaceæ.*

(*Ind. and Col. Addendum.*)

Syn.—"Kava-Kava." **Habitat.**—Australasian Colonies.

Source—The dried decorticated rhizome, without roots, of *Piper methysticum.*

Characters.—½ to 2 in. thick, in irregular fragments of a pale greyish color.

Composition.—(1) *Kavalin* or *Methysticin* about 1%, a neutral crystalline principle allied to 'Piperin'. (2) Two resins, one of which is *Kawine:* (3) An essential oil.

B.P. Dose.—5 to 10 grs.

OFFICIAL PREPARATION.

1. **Extractum Kavæ Liquidum.**—1 in 1 of alcohol 90 and 45 p.c. **B.P. Dose.**—30 to 60 ms.

PHARMACOLOGY AND THERAPEUTICS.

Kava is a useful bitter tonic with an agreeable taste, and a stimulant. Taken in small doses it sharpens the mental faculties and removes fatigue and languor, therefore it resembles caffeine. In larger doses it acts upon the spinal cord, when it causes an ataxic gait, the intellectual faculties remaining unaltered. As a local anæsthetic it acts like cocaine, and when applied to a mucous membrane it produces burning followed by anæsthesia. In toxic doses Kava produces general anæsthesia and paralysis by its depressing action on the cord and the peripheral endings of the sensory nerves. This action is mainly due to the resin *kawine* present in it. It is a diuretic, and many authors claim for it an alterative action upon the **genito-urinary organs**. It is said to be useful in **gonorrhœa**, especially when accompanied and complicated with **gout, gleet** and **cystitis**. In the form of an infusion it is taken as an intoxicating liquor which it is said has an antisyphilitic virtue.

The best form for administration is the liquid extract.

KINO. Kino. N. O. *Leguminosæ.*

Syn. I. V.—*Pit-sal*, Beng. *Bija*, *Bijasar*, Hind.

Habitat.—Malabar in India.

Source.—The juice, obtained from incisions in the trunk of *Pterocarpus marsupium*, evaporated to dryness.

Characters.—Small, angular, glistening, opaque, reddish-black, brittle fragments; transparent and ruby-red at the edges, inodorous. Astringent, tinging the saliva red. *Solubility.*—Partially in cold water, almost entirely in alcohol 90 p. c.

Composition.—(1) *Kino-tannic acid*, 75 p. c. (2) *Kinoin*, a neutral crystalline substance, (3) *Pyrocatechin.* (4) *Kino red*, (5) *Gum.*

Incompatibles.—Alkalis, mineral acids, metallic salts, carbonates, gelatin.

Action.—A strong intestinal astringent. **B.P. Dose.**—5 to 20 grs. in cachets.

Enters into.—Pulv. Catechu Co. and the

OFFICIAL PREPARATIONS.

1. **Pulvis Kino compositus.**—3 in 4. 1 opium in 20. **B. P. Dose.**—5 to 20 grs.
2. **Tinctura Kino.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Trochisci Kino** (T. H.).—2 grs. in each, with Black Currant paste.

KINO EUCALYPTI. Eucalyptus kino.

(Ind. and Col. Addendum).

Syn. B.P.—Botany Bay kino.

Habitat.—Australasian Colonies.

Source.—An exudation from the stem of various species of eucalyptus having the characters and answering to the tests for kino.

B.P. Dose.—5 to 20 grs. in powder.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Kino resembles catechu and kramaria in action. As it contains 75 p. c. of **kino-tannic acid**, it is a powerful intestinal astringent, and a useful remedy in **diarrhœa** and **dysentery**. In **relaxed conditions** of the **throat**, the lozenge affords great relief. Sometimes it is given in **hæmorrhages** as a substitute for tannic acid.

KRAMERIÆ RADIX. Krameria Root.

N. O. *Polygalaceæ.*

Syn. B.P.—Rhatany Root.

Source.—The dried root of (1) Para Rhatany, a species of krameria attributed to *krameria argentea;* or of (2) Peruvian Rhatany *krameria triandra.*

Characters.—(1) *Para,*—Cylindrical pieces, purplish-brown, smooth thick bark, marked by deep cracks and adhering firmly to the reddish-brown colored wood. Fracture short. (2) *Peruvian.*—Dark reddish-brown, readily separable from yellowish woody axis. Bark thinner than of *Para,* rough and scaly. The bark of both kinds has a strong astringent taste. and tinges saliva red.

Composition.—(1) *Rhatanhia-tannic acid,* 20 p. c. (2) Rhatanhia red, the coloring matter (3) Rhatannin, neutral substance.

Incompatibles.—Alkalis, lime water, iron and lead salts and gelatin.

Action.—A powerful astringent and tonic. *Dose.*—20 to 60 grs. in powder.

Enters into.—Pulv. Catechu. Co and the

Official Preparations.

1. **Extractum Kramariæ.** *Syn. B.P.—Extract of Rhatany.*—A deep reddish brown *solid* extract. **B.P. Dose.**—5 to 15 grs. in pill or with chalk mixture.
2. **Infusum Krameriæ.** *Syn. B.P.—Infusion of Rhatany.*—1 in 20 (¼ hour). **B.P. Dose.**—½ to 1 oz.
3. **Liquor Krameriæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.
4. **Tinctura Krameriæ.** *Syn. B.P.—Tincture of Rhatany.*—1 in 5. A deep red liquid. **B.P. Dose.**—½ to 1 dr
5. **Trochiscus Krameriæ.**—*Syn. B.P.—Rhatany Lozenge.*—1 gr. in each
6. **Trochiscus Krameriæ et Cocainæ.** *Syn. B.P.—Rhatany and Cocaine lozenge.*—1 gr. extract and $\frac{1}{20}$ gr. Cocaine Hydrochloride in each.

Non-Official Preparations.

1. **Ext. Kramer. Fluidum U. S**—Rhatany root 1, exhaust with dilute Alcohol and Glycerin to make 1 of fluid extract.
2. **Gossypium Krameriæ T.H.**—Tincture of Rhatany ½ oz., Glycerin 10 ms. Cotton Wool 60 grs. Saturate and dry.
3. **Suppositorium Krameriæ.**—Extract of Rhatany 8 grs., Morph. Hyd. $\frac{1}{10}$ gr., Stearin 10 grs.
4. **Syr. Krameriæ U.S.**—Fluid Extract of Krameria 45, Syrup 35.

Pharmacology and Therapeutics.

Internally.—Rhatany is a powerful **astringent,** because of the tannic acid it contains. Powdered root forms an important ingredient in many dentifrices and the tincture in mouth-washes. A teaspoonful of tincture in 1 oz. of water or the infusion of the root, makes a good gargle in **relaxed sore throat, spongy** and

ulcerated gums and **mercurial stomatitis**. Krameria and cocaine lozenge is very efficacious in **sore throat**. The infusion may also be used in **gonorrhœa** and **leucorrhœa**. Krameria is one of the best intestinal astringents in **diarrhœa**. and may be employed as well to stop the bleeding from the stomach and bowels. As a remote **hæmostatic** it is now seldom used.

LAUROCERASI FOLIA.

Cherry Laurel Leaves. N. O. *Rosaceæ*.

Habitat.—Britain (cultivated).

Source.—The fresh leaves of *Prunus laurocerasus*.

Characters.—Thick, coriaceous, short petioled, oblong or obovate, 5 to 7 in long, tapering towards each end, recurved at the apex, distantly but sharply serrate, dark green, smooth, shining above, paler below. Midrib prominent, with glandular depressions on either side. Inodorous, bitter almond odor when bruised.

Composition.—(1) *Hydrocyanic acid* and (2) a *Volatile oil* by a process of decomposition as in bitter almonds (See page 232).

Incompatibles and antidotes.—The same as of dilute hydrocyanic acid. (See page 195.)

OFFICIAL PREPARATION.

1. **Aqua Laurocerasi.**—1 lb. to 1 pint. Should contain $\frac{1}{10}$ p.c. HCN. Should be standardized if necessary. It requires also to be tested occasionally as it loses strength by keeping. Sedative. **B.P. Dose.**—$\frac{1}{2}$ to 2 drs. 20 ms. equal to 1 m. of hydrocyanic acid dil.

PHARMACOLOGY AND THERAPEUTICS.

Aqua laurocerasi possesses the properties of acid hydrocyanic dil. but, as its strength is apt to vary on account of the volatilization of the prussic acid it contains, it is not generally used in stead of the acid; although often prescribed as a flavoring agent.

LAVANDULÆ OLEUM.

Oil of Lavender. N O. *Labiatæ*.

Source.—The oil distilled from the flowers of *Lavandula vera* cultivated in England and western shores of the Mediterranean.

Characters.—Pale yellow or colorless with fragrant odor of flowers and a pungent bitter taste. Sp. gr. not below 0·885. *Solubility.*—1 in 4 of alcohol 70 p.c. *Impurities.*—Oils of spike and turpentine.

Composition.—(1) *Linalool*, an alcohol and oxidation product of terpene myrcene. (2) *Linalool acetate*, the principal constituent of oil of bergamot. The value of the oil depends upon the latter ingredient, which should be 30 p.c. (3) Pinene $C_{10}H_{16}$ is present in some samples but is not a constant constituent.

Action.—Stimulant, carminative. **B.P. Dose.**—$\frac{1}{2}$ to 3 ms. Rarely used alone.

Enters into.—Lint. Camph. Ammon. and the

OFFICIAL PREPARATIONS.

1. **Spiritus Lavandulæ.**—1 in 10. **B.P. Dose.**—5 to 20 ms. on sugar.

2. **Tinctura Lavandulæ Composita.**—45 ms. to 1 pint. A bright crimson liquid. **B.P. Dose.**—½ to 1 dr. for coloring mixtures.

Enters into.—Liqr. Arsenicalis, to prevent formation of moulds.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Oil of lavender is used to perfume liniments, and the tincture to color lotions. It is an ingredient of smelling salts and lavender water.

Intetnally.—Like other aromatic oils, it is a stimulant, carminative and anti-spasmodic, and can be used in **flatulence, colic, hypochondriasis, hysteria,** and **neurasthenic affections.** But its chief use is confined to coloring and flavoring purposes.

LIMONIS CORTEX. Lemon Peel.

N. O. *Rutaceæ.*

Habitat.—South of Europe.

Source.—The fresh outer part of the pericarp of the fruit of *Citrus medica* var. *B. Limonum.*

Characters.—Pale yellow, rough outside from glands containing volatile oils imbedded in it ; inner surface should have a thin white portion. Odor characteristic, fragrant. Taste warm, aromatic, bitter.

Composition.—(1) *Volatile oil, Oleum Limonis* (off). (2) *Hesperidin,* a bitter principle.

Enters into.—Inf. Aurantii Co., Inf. Gent. Co. and the

OFFICIAL PREPARATIONS.

1. **Oleum Limonis.**—A pale yellow bitter aromatic *volatile oil* obtained from fresh lemon peel ; chiefly used for flavoring. **B.P. Dose.**—½ to 3 ms. *Enters into.*—Lin. Pot. Iod. cum Sapone, Spt. Ammon. Aromat., Tr. Guaiaci Ammoniata, and Tr. Valer. Ammon.

2. **Succus Limonis.**—30 to 40 grs. of citric acid in 1 oz. A slightly turbid yellowish liquid, being the freshly expressed juice of the ripe fruit of *Citrus medica* Var. *B. Limonum*

110 ms. of lemon juice are neutralised by 11½ grs. of Pot. Bicarb., 9½ grs. of Sod. Bicarb., and 16½ grs. of Sod. Carbonate. Acid. Citric is prepared from it.

3. **Syrupus Limonis.**—1 peel and 25 juice in 65. A yellowish syrup. **B.P. Dose.**—½ to 1 dr.

4. **Tinctura Limonis.** (Altered).—1 in 4. Sherry colored. **B.P. Dose.**—½ to 1 dr.

NON-OFFICAL PREPARATION.

1. **Citral.**—An aldehyde having 15 times more flavoring power than the oil.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The actions of lemon peel are similar to those of orange peel. The oil is a stimulant and carminative and can be used to expel intestinal flatus. In practice both of them are used for flavoring purposes. Lemon juice is antiscorbutic. Whitla says that the decoction of sliced fresh unpeeled lemon is a valuable antiperiodic in malaria.

LINUM. Linseed. N.O. *Lineæ.*

Syn.—Flax. **Syn. I. V.**—*Tisi*, *Mashiná*, Beng. *Alsi*, *Hindi.*

Habitat.—Britain, Holland, Russia and India.

Source.—The dried ripe seeds of *Linum usitatissimum.*

Characters.—Small, brown, glossy, nearly flat, $\frac{1}{6}$ to $\frac{1}{4}$ in. long, ovate, obliquely pointed, surface glabrous. Internally yellowish-white with two oily cotyledons. *Envelope, or testa, mucilaginous.* Three varieties are seen in Calcutta, brown, white and red.

Composition.—(1) *Mucilage* in the testa. (2) *Fixed oil* (off.), which consists of *glyceryl* combined with *linoleic acid*; 25 to 30 p.c.

Action.—Demulcent, emollient and nutrient.

OFFICIAL PREPARATIONS.

1. **Linum Contusum.** *Syn.—Linseed Meal.*—Linseed reduced to coarse powder, should be recently prepared. Used in making **Cataplasma Lini.** (See Cataplasms, page 67.)

2. **Oleum Lini.**—The oil expressed from linseed at ordinary temperatures. Viscid, yellow, with faint odor and bland taste. Boiled and Dutch oils are to be avoided. Fresh oil should, if possible, be used.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Contused linseed in the form of a warm poultice is used to disperse threatening **abscesses, boils, carbuncles lymphangitis** or **local inflammations,** by dilating the local blood-vessels, and relaxing the tissues, thereby relieving the tension and pain caused by pressure over the periphery of the sensory nerves. But if the poultice is too hot it increases pain and tension. If the leucocytes have already passed through the coats of the vessels, and **suppuration** has commenced, a warm poultice helps it to reach the surface. Hot linseed meal poultice is an excellent, mild, continuous **counter-irritant** for **deep-seated inflammations,** such as **pneumonia, bronchitis, bronchopneumonia, pleuritis, pericarditis, peritonitis, arthritis, pelvic cellulitis,** &c. The counter-irritant effect can be greatly increased by dusting powdered mustard over the surface of the poultice, or mixing it (1 in 16) with the meal. Iced poultice may also be employed in **pneumonia** or other local inflammations.

The oil makes a good emollient application to **burns** and **scalds** in the form of **carron oil** (see page 293). The oil can also be used as an *enema* (1 ℔) in impacted conditions of the rectum and lower colon.

Internally.—Linseed tea, *i.e.*, the infusion of linseed, especially when combined with lemon, is a reputed domestic demulcent drink in **throat cough.** Possibly it has a slight expectorant effect. The ordinary formula for a linseed-tea is linseed 2½ drs., liquorice root 1 dr., boiling water 10 ozs., infuse for two hours. This can be taken sweetened with sugar. It has a slightly diuretic action and a patient with an **irritable bladder** or suffering from **gonorrhœa** often finds relief by copious linseed drinks.

LITHII CARBONAS. Lithium Carbonate. $Li_2 CO_3$.

Source.—Obtained from native silicates of lithium.

Characters.—In white powder or minute crystalline grains. *Solubility.*—1 in 70 of water, insoluble in alcohol 90 p. c. *Impurities.*—Lime, alumina, &c.

Action.—Antacid, diuretic and antilithic. **B.P. Dose.**—2 to 5 grs.

LITHII CITRAS. Lithium Citrate.

$C_3H_4O.H. (COOLi)_3, 4 H_2O$.

Source.—Prepared by saturating citric acid with lithium carbonate.

Characters.—A white crystalline deliquescent salt. *Solubility.*—1 in 2 of water.

Action.—The same as of carbonate. **B.P. Dose.**—5 to 10 grs. freely diluted in ærated water.

OFFICIAL PREPARATION.

1. **Lithii Citras Effervescens.**—1 in 20. A white granular powder. **B.P. Dose.**—60 to 120 grs.

NON-OFFICIAL PREPARATIONS OF LITHIUM.

1. **Lithii Benzoas.**—A white crystalline powder, soluble 1 in 2½ of water. Antilithic. *Dose.*—15 to 30 grs.

2. **Lithii Bromidum.**—A white granular deliquescent salt, soluble 1 in 1 of water. Contains nearly half as much again of bromine as the same weight of potassium bromide. A good hypnotic in gout. Used in insomnia, epilepsy, Bright's disease. *Dose.*—5 to 15 grs.

3. **Lithii Guaiacas.**—Consists of Lithium oxide 1, Guaiacum resin 3. Introduced by Garrod for chronic gout and rheumatism. *Dose.*—5 grs. twice daily.

4. **Lithii Hippuras.**—White minute crystals, soluble in water. Powerful antilithic. In uric acid, gravel, gout and rheumatism. *Dose.*—5 to 20 grs.

4½. **Lithii Iodidi.**—White powder, soluble in water. *Dose.*—1 to 5 grs.

5. **Lithii Salicylas U. S.**—A deliquescent white powder. *Dose.*—50 to 20 grs.

6. **Lithii Tartras Acidus.**—Finely crystalline. Specially useful in gouty cases with gum affections. *Dose.*—5 to 20 grs.

7. **Lithio-piperazine.**—A powerful solvent of uric acid in 10 grs. doses.

8. **Lithium Symphoral.**—A powerful diuretic in 15 grs. in gout and dropsy. Contains caffeine-sulfonic acid.

10. **Uricedin.**—Soluble brownish-yellow granules containing citrate of lithium with citrates and sulphates of alkalis. Useful in uric acid diathesis, urinary calculi, gout and articular rheumatism. *Dose.*—1 to 2 drs.

11. **Uropherin.** *Syn.—Lithium Diuretin.*—A white powder, soluble in water, powerful diuretic in Bright's disease and cardiac dropsy. *Dose.*—5 to 15 grs.

PHARMACOLOGY.

Internally.—Lithium salts are readily absorbed and are believed to increase the **alkalinity of blood**. They resemble coresponding potassium salts in their actions : with this difference that, (1) they are powerful **solvents of uric acid**, by combining with it and forming *urate of lithium*, which is very soluble, (2) they are *stronger diuretics*, and (3) they are **less depressants to the heart**, in which respect they more closely resemble sodium than potassium salts They render the **urine alkaline**, holding in solution excess of uric acid, therefore their prolonged use helps to dissolve **uric acid calculi**. Hence, they are urinary lithontriptics. They are eliminated by the urine. Recent investigations have thrown considerable doubt upon the value of lithia as a solvent of uric acid in the human body. In a test tube it is a beautiful solvent, but when taken internally it forms a nearly insoluble triple phosphate with phosphate of soda, which not only prevents its action on uric acid but puts out of use a certain amount of phosphate, which is itself a solvent for uric acid. Moreover, as a matter of fact, Haig has shown that the administration of lithia actually decreases the elimination of uric acid by the urine.

THERAPEUTICS.

Externally.—A lotion of the carbonate (1½ drs. to 1 pint) applied on lint and covered with guttapercha is a useful local application for removing gouty inflammation of joints, gouty ulcers and deposits.

Internally.—Lithium salts were formerly considered to be of special value in both **acute** and **chronic gout**, by helping the solution of biurate of sodium, and eliminating it. For its solvent action on uric acid, they were given in **uric acid diathesis**, and **uric acid calculi**, but the recent observations alluded to above have now rather discredited lithium as a remedy for gout and lithiasis. The salts should be freely diluted before administration. The carbonate 5 grs. given with ærated water 10 ozs. does not irritate the stomach, but lithii citras effervescens is more agreeable, although it becomes a carbonate in the blood. Up to 1 oz. of the citrate may be given daily.

LOBELIA. Lobelia. N.O. *Lobeliaceæ.*

Habitat.—North America.

Source.—The dried flowering herb of *Lobelia inflata.*

Characters.—Stems angular, channelled, with narrow wings; purplish, hairy, scarred. Leaves alternate, toothed, hairy. Capsules inflated, two-celled, containing brown seeds. Odor irritating. Taste after chewing, burning and acrid.

Composition.—(1) *Lobeline*, a volatile liquid oily alkaloid. (2) *Lobelic acid* remains united with lobeline. (3) *Lobelacrin.*

Incompatibles.—Caustic alkalis, which decompose lobeline.

Action.—Depressant, antispasmodic, diaphoretic and diuretic.

OFFICIAL PREPARATION.

1. **Tinctura Lobeliæ Ætherea.**—1 in 5. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Lobeline Sulphate.**—In deliquescent, yellow, friable pieces, soluble in water. Used in asthma, dyspnœa, whooping cough, and spasmodic neurosis. *Dose.*—$\frac{1}{50}$ gr. or more with caution.
2. **Tinct. Lobeliæ. B.P.** 85.—2½ozs. to 1 pint. By maceration and percolation with proof spirit. *Dose.*—10 to 30 ms.

PHARMACOLOGY.

The action of lobelia resembles that of tobacco in many respects.

Internally. **Gastro-intestinal canal.**—Whether absorbed by the skin or the stomach, lobelia, in large doses, produces **gastro-intestital irritation**, causing vomiting, purging and great prostration. The vomiting is probably due to the primary stimulation of the vomiting centre.

Heart and circulation.—Lobeline enters the circulation. Observations on frog's heart show that it first stimulates and then **depresses**, and finally arrests its action in diastole. **Blood-pressure falls.** This is ascribed to its influence over the heart and the paralysis of the vasomotor centre.

Respiratory passage.—It is a powerful **respiratory sedative.** It slows respiration in small doses, and in large ones powerfully depresses the respiratory centre so that **death** takes place from **respiratory failure** before the stoppage of the heart. It relaxes the bronchial muscles, hence it is a **bronchial antispasmodic.**

Nervous system and muscles.—The convolutions are secondarily affected only by toxic doses, when coma, and sometimes convulsions, may occur. Besides its depressing effects on the cardiac, respiratory and vasomotor centres, it lowers the activity of the motor centre of the cord, causing **relaxation** of **muscles.**

Elimination.—Lobelia is probably thrown off by the skin and kidneys, producing **diaphoresis** and **diuresis.**

Toxic action.—Poisoning is rare. When it occurs, it is usually accompanied by those symptoms already mentioned above, *i.e.*, gastro-intestinal irritation, cardiac and respiratory depression, collapse, coma, cold perspiration, sometimes convulsions and death.

Antidotes.—Pumps, emetics, tannin, later on stimulants, as brandy, ammonia, ether, strychnine $\frac{1}{30}$ gr. hypodermically, morphine or opium in small doses, external warmth, friction, sinapisms, horizontal position.

THERAPEUTICS.

Internally.—Therapeutically it is used like stramonium. For its powerful bronchial antispasmodic action it is very often used in **asthma**, either (1) in full doses ($\frac{1}{2}$ to 1 dr.) of the tincture every one or two hours, until nausea is experienced, or the relief is obtained ; or (2) in 10 to 15 ms. every 10 or 15 minutes until the dyspnœa gives way. It must be noted that large doses sometimes cause great depression. If there is more or less tightness throughout 24 hours the patient must have 10 ms. thrice daily, besides a few extra doses during the paroxysm. Often speedier relief is obtained by combining it with bromides, iodides, or morphine, as in the formula used by the writer in bronchial asthma always with success.—Tr. Lobel. Æther ʒiii, Pot. Iodide ʒii, Pot. Bromide ʒiii, Aqua Chloroformi ad ℥viii. Mft. mist. $\frac{1}{12}$th part every one or two hours until relieved.

It is also used in **spasmodic bronchitis**, and **whooping cough**, relieving the paroxysmal dyspnœa and spasms. It has also been employed in **cough** and **laryngismus stridulus.**

LUPULUS. Hops. N.O. *Cannabineæ.*

Syn. B.P.—Humulus.

Habitat.—England (Kashmir and Dera Dun).

Source.—The dried strobiles of *Humulus lupulus* collected from cultivated plants.

Characters.—Strobiles 1¼ in. long, oblong-ovoid or rounded, consisting of imbricated greenish-yellow, membranous stipules and bracts, attached to a hairy axis. Odor aromatic. Taste bitter, aromatic and astringent.

Composition.—(1) *Lupulin*, a liquid alkaloid. (2) *Lupulinic acid.* (3) *Valerol* an aromatic oil giving odor. (4) *Resin.* (5) *Tannin.* (6) Sesquiterpene.

Incompatibles.—Mineral acids and metallic salts.

OFFICIAL PREPARATIONS.

1. **Infusum Lupuli.**—1 in 20 (¼ hour). **B.P. Dose.**—1 to 2 ozs.
2. **Tinctura Lupuli.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Extractum. Lupuli. B.P. 1889.**—*Dose.*—5 to 15 grs. in pill.

LUPULINUM. Lupulin.

Source and **Characters**.—A granular brownish-yellow glandular powder obtained from the dried strobiles of *Humulus Lupulus*.

Action.—Aromatic, tonic and sedative. **B.P. Dose**.—2 to 5 grs.

NON-OFFICIAL PREPARATIONS.

1. **Ext. Lupulini Fluidum U. S.**—*Dose.*—10 to 30 ms.
2. **Oleoresina Lupulini. U.S.**—*Dose.*—1 to 20 grs.
3. **Tinctura Lupulini U.S.**—1 in 8. *Dose.*—10 to 60 ms.

PHARMACOLOGY.

Internally.—Hops belong to the class of aromatic bitters, and are therefore **stomachic** and **tonic**, due to the aromatic oil and lupulic acid, the bitter principle, they contain. They have also slight **hypnotic** property. Whether this is due to the aromatic oil or the alkaloid is not yet known. The stimulant effect of the aromatic oil is greatly enhanced by alcohol as in beer.

THERAPEUTICS.

Internally.—As a remedy hops are rarely used, but in the forms of pure bitter ales, they are extremely serviceable in helping digestion and promoting appetite during convalescence, or when digestion has become enfeebled from any other cause. The official preparations are sometimes given with benefit in **nymphomania, satyriasis, nervous irritability, delirium,** &c. Sometimes they check the morbid desire for drink.

A hop pillow (stuffed with hops instead of cotton) is often very useful as a remedy for insomnia.

MAGNESIA LEVIS.

Light Magnesia. MgO.

Syn. B.P.—Light Calcined Magnesia, Light Magnesium Oxide.

Source.—Prepared by exposing light magnesium carbonate to a dull red-heat.

Characters.—A light bulky white powder, 3½ times lighter than heavy magnesia.

B.P. Dose.—5 to 30 grs. for repeated administration ; 30 to 60 grs. for a single dose.

Enters into.—Pulv. Rhei Co.

MAGNESIA PONDEROSA.

Heavy Magnesia. MgO.

Syn. B.P.—Heavy Calcined Magnesia, Heavy Magnesium Oxide.

Source.—Prepared by exposing heavy magnesium carbonate to a dull-heat

Characters.—A white powder insoluble in water, but readily dissolved by acids. **Incompatibles**.—All acids.

Action.—Antacid, laxative and antilithic. **B.P. Dose.**—The same as light magnesia.

MAGNESII CARBONAS LEVIS.

Light Magnesium Carbonate. $3(MgCO_3), Mg(HO)_2, 4H_2O$.

Source.—Prepared by mixing *cold dilute* solutions of magnesium sulphate and sodium carbonate, boiling for 15 minutes, and filtering, washing and drying : $4MgSO_4 + 4Na_2CO_3 + 5H_2O = (MgCO_3)Mg(HO)_2 4H_2O + 4Na_2SO_4 + CO_2$.

Characters.—A light white powder consisting of amorphous particles and slender prisms. *Solubility.*—1 in 2500 of cold water.

B.P. Dose.—5 to 30 grs. for repeated administration ; 30 to 60 grs. for a single dose.

MAGNESII CARBONAS PONDEROSUS.

Heavy Magnesium Carbonate. $3(MgCO_3), Mg(HO)_2, 4H_2O$.

Source.—Prepared as the light carbonate, but with *strong boiling* aqueous solutions.

Characters.—A white granular powder. *Impurities.*—Lime, sulphates.

Action.—Antacid, purgative. **B.P. Dose.**—The same as light carbonate.

Enters into.—The preparation of Magnesia Ponderosa, Troch. Bismuthi Co. and the

OFFICIAL PREPARATION.

1. **Liquor Magnesii Carbonatis.** *Syn. B.P.—Fluid Magnesia.*—10 grs. in 1 oz. Antacid and agreeable aperient, less liable to form concretions in the colon than lighter preparations. **B.P. Dose.**—1 to 2 ozs. ½ dr. for a child 1 year old.

NON-OFFICIAL PREPARATIONS.

1. **Mistura Alba.**—Mag. Carb. 1½ drs., Mag. Sulph. 4 drs., Peppermint water 6 ozs. *Dose.*—½ to 1 oz. as an aperient.
2. **Liquor Magnesii Bromidi.**—Neutralise Acid Hydrobromic Dil. 20 ozs. (10 p.c.) with Magnesium Carbonate 1 oz. ; filter. *Dose.*—1 to 3 drs. in insanity.
3. **Magnesium Citrate** (Merck).—A soluble salt. *Dose.*—30 to 125 grs.
4. **Magnesium Citratis Liquor. B.P. 1885.** *Syn.—Lemonade Purgative.*—Magnesium Carbonate 100 grs., Acid Citric 200 grs., Syrup of Lemons ½ oz., Pot. Bicarb (cryst.) 40 grs., Water to ½ pint. A pleasant refrigerant draught and saline aperient. *Dose*—5 to 10 ozs.
5. **Red Mixture** (Dr. Goodeve's).—Mag. Carb. Pond. 30 grs., Rhubarb 10 grs., Spt. Amon. Aromat. 30 ms., Oil. Anisi 2 drops., Water to 2 ozs. Mix. *Dose.*—One tea-spoonful every 3 or 4 hours till bowels operate.

MAGNESII SULPHAS. Magnesium Sulphate.

$MgSO_4, 7HO_2$.

Syn. B.P.—Epsom salts.

Source.—Prepared by the interaction of native magnesium carbonate and diluted sulphuric acid, $MgCO_3 + H_2SO_4 = MgSO_4 + H_2O + CO_2$; or purifying the native sulphate.

Characters.—Small, colorless, transparent, rhombic prisms. Taste bitter. *Solubility.*—1 in 1 of cold water.

Identification.—Epsom salts resemble zinc sulphate, but they are distinguished by the absence of metallic taste, the crystals being more or less coherent and by the absence of opaque or powdery appearance when exposed to air.

Incompatibles.—Potassium and sodium carbonates and bi-carbonates, limewater, lead acetate, and tartarated soda which precipitates magnesium tartrate.

Action.—Hydragogue purgative. **B.P. Dose.**—30 to 120 grs. for repeated administration ; ¼ to ½ oz. for a single dose.

OFFICIAL PREPARATION.

1. **Magnesii Sulphas Effervescens.** *Syn. B.P.—Effervescent Epsom Salts.*—Antacid and cathartic. **B.P. Dose.**—60 to 240 grs. for repeated use ; ⅓ to 1 oz. for a single dose.

NON-OFFICIAL PREPARATION.

1. **Magnesii Salicylas.**—Colorless hygroscopic needles, soluble in water. Given with advantage in typhoid fever in 50 to 100 grs. daily.

PHARMACOLOGY.

Externally.—None.

Internally. **Gastro-intestinal canal.**—Both oxide and the carbonates are **alkaline**, and neutralise the normal or the excessive acidity of the stomach, and are converted into chloride or lactate, both of which are soluble. What is unaffected is left insoluble. The carbonate sets free carbonic acid, which exerts local sedative influence. Therefore they are **antacid.** On account of the low diffusion power, the chloride and lactate, though soluble, are not freely absorbed ; consequently almost all the magnesia is transmitted to the intestines, where the chloride is decomposed by the alkaline bile, and the oxide reprecipitated, which is converted first into carbonate and then into bicarbonate by the carbonic acid gas of the bowels. Thus the oxide, the carbonate or the sulphate if directly given, will act as **purgatives** only after conversion into bicarbonates.

Prof. Hay's experiments have proved that magnesium sulphate produces intestinal secretion in proportion to the dosage and strength of the solution administered, no doubt the low diffusion power of the salt preventing the absorption of the secreted fluid ; hence, with the retarded absorption and stimulated secretion, the fluid accumulates in the intestines till the quantity amounts to what would be necessary to make about 5 or 6 per cent of the solution of salt. The weaker the solution the less the secretion, and if the salt in the solution is less than 5 per cent there is no secretion into the bowels. Again, if the solution is concentrated and given during fasting, profuse serous discharge within the bowels is the result. Thus, by 1 or 2 ozs. of salt dissolved in its own weight of water, such a hydragogue purgation can be induced, as will be equal to a depletion by blood-letting.

Most of the magnesium salts are passed out unaltered in the stools. Magnesium sulphate does not stimulate the liver.

According to some, magnesium sulphate (2 grs.) given hypodermically purges ; the purgative action is probably due to the paralysis of the inhibitory nerves of the intestine.

Blood.—Magnesium salts enter the blood as a chloride or lactate and render the **plasma more alkaline**.

Urine.—The little salt that is absorbed is passed out by the kidneys, **increasing the flow of urine**, rendering it **alkaline**, and to a certain extent **dissolving uric acid** ; but the diuretic effect is weaker than that of the potassium and sodium salts.

THERAPEUTICS.

Internally.—The oxide and the carbonate are largely employed in **acid dyspepsia, heart-burn, pyrosis, vomiting, sick headache**, or any other complaint attended with acidity. Their antacid property is considerably increased by combining them with sodium bicarbonate and sal volatile. As a tasteless, unirritating alkaline laxative, they are often used in combination with rhubarb, as Pulv. rhei co. and Goodeve's red mixture in **constipation of children**. Liq. magnesii carb. is an agreeable and alkaline laxative in **acid** dyspesia accompanied with constipation.

As chemical **antidotes**, they are successfully used in **poisoning** by **mineral acids, oxalic acid**, and the salts of **mercury, arsenic** and **copper**, as they form insoluble compounds with them. In **alkaloidal poisoning**, they hinder the absorption of alkaloids by making the contents of the stomach alkaline. But in order to get these antidotal effects, they must be given in very large doses, which is the only objection. Magnesium sulphate acts as an **antidote** to **lead** and **barium** salts by precipitating their insoluble sulphates.

As a **diuretic** and feeble alkalinizer of blood and urine, they are used in **gout** and **gravel** cases, where the salts of potassium and sodium are not borne. Many mineral waters containing magnesium are valuable diuretics, such as Harrogate, Carlsbad, Ems, Baden-Baden, &c.

Magnesium sulphate (Epsom salt) is almost daily used as a **purgative**. Its action is less rapid than that of sodium sulphate (Glauber's salt) but is free from nausea and griping. It can be given in the form of Mist. sennæ co. or in solution with aromatics In **biliousness** or **portal congestion**, it is best given to complete the action of cholagogue pills. It makes an excellent aperient for those who are gouty, and suffer from uric acid gravel. It has been successfully used in **tropical dysentery**, and according to Wyatt-Smith, Mist. alba is a specific for this complaint when given in full doses. Large quantities of **serum** can be drained off through the bowels by giving concentrated solutions during fasting, so that **dropsy, anasarca, ascites, pleurisy**, &c., can be greatly reduced. Many popular mineral waters, such as Hunyadi Janos, Friedrichshall and Pulna owe their purgative action to the magnesium sulphate they contain. The dose of magnesium sulphate can be reduced by mixing it with acid sulph. dil., which increases the intestinal peristalsis. It is an excellent laxative to ward off the constipating effect of ferrous sulphate in cases of **anæmia**.

Caution.—If large doses of magnesia or magnesium carbonate are given for any length of time, concretions of ammonio-magnesium phosphate are apt to form in the bowel, leading to intestinal obstruction, peritonitis, perforation and death. Care must therefore be taken to watch the patients who are taking this medicine regularly. If a moderate degree of concretion is diagnosed, full doses of vinegar deserve a trial.

Prescribing hints.—Epsom salts are generally given in mixtures. The nasty taste can very well be covered by liquorice or choloroform To prevent their griping properties aromatics or carminatives should be combind with them. The carbonates and the light and heavy magnesia are generally administered in **pills, cachets** or **lozenges**. When in solution they are best given in the form of Mist. Alba. The heavy magnesia sometimes becomes aggregated into a solid mass when ordered in a mixture.

MEL DEPURATUM. Clarified Honey.

Source.—Commercial honey melted in a water-bath, and strained, while hot, through flannel previously moistened with warm water.

Characters.—A viscid, translucent, yellowish liquid, becoming crystalline and opaque. Odor honey-like. Taste sweet. *Impurities.*—Starch, syrup, &c.

Composition.—A mixture of several kinds of sugar, viz.—Cane-sugar, grape-sugar, levulose, wax, pollen, coloring and odorous matters, &c.

Enters into.—Confectio Piperis, and the

OFFICIAL PREPARATIONS.

1. **Mel Boracis.**—1 in 7 by volume.
2. **Oxymel.**—4 in 5. Expectorant. More as a vehicle. **B.P. Dose.**—1 to 2 drs.
3. **Oxymel Scillæ.**—Expectorant. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Honey is a demulcent and is used as a covering to boils and **excoriations**. It is also used as a cosmetic.

Internally.—It is said to increase the secretions of the mouth and throat, and thus acts as a **demulcent**, relieving dryness of the mouth, cough, and difficulty in swallowing. Hence, it is used in gargles, cough mixtures and linctuses It is a **nutrient** and in large doses **laxative**, and is therefore used to open the bowels of infants. Honey makes an excellent vehicle for castor oil and for administation to new-born babes and infants.

MENTHÆ PIPERITÆ OLEUM.

Oil of Peppermint. N.O. *Labiatæ.*

Habitat.—Britain, United States, Japan, &c.

Source.—The oil distilled from fresh flowering peppermint, *Mentha piperita.*

Characters.—Colorless, pale yellow, or greenish-yellow when fresh, becoming darker by age. Odor of the herb. Taste aromatic, followed by a sensation of coldness. Sp. gr. 0·900 to 0·920. *Solubility.*—1 in 4 of alcohol 70 p. c. *Impurity.*—Dementholised oil of peppermint known as "Menthene."

Composition.—Contains several hydrocarbons ($C_{10}H_{16}$), *menthone* ($C_{10}H_{18}O$) and other bodies, and deposits crystalline peppermint camphor known as *menthol* when exposed to low temperatures. *Japanese oil* contains largest percentage of menthol, and *American* less. There are all manner of gradations of the English oil.

Action.—Stimulant, antispasmodic, carminative. **B.P. Dose.**—½ to 3 ms. on sugar or pill.

Enters into.—Pil. Rhei Co., Tr. Chlorof. et Morph. Co., and the

OFFICIAL PREPARATIONS.

1. **Aqua Menthæ Piperitæ.**—1 in 1,000. *Dose.*—1 to 2 ozs. 1 dr. for a child 1 year old.
2. **Spiritus Menthæ Piperitæ.**—1 in 10. **B.P. Dose.**—5 to 20 ms. This is half the strength of that of B.P. 1885.

NON-OFFICIAL PREPARATIONS.

1. **Peppermint Syrup.**—Spt. Menth. pip. 1 dr. in Simple Syrup 1 oz.
2. **Peppermint Lozenge.**

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The action of the oil of peppermint resembles that of the volatile oils generally, but the sensation of coldness and numbness after a feeling of warmth is more marked This is due to the contraction of the local blood vessels after a brief stimulation and to the sedative action on the nerves. Hence, it is a local **anæsthetic** and is therefore used to allay the pain of superficial **neuralgias** and **herpes zoster**. It is also a powerful **antiseptic**, and employed in **diphtheria**. It relieves the **toothache** due to a carious tooth. The smell of the oil is said to keep off mosquitoes.

Internally.—It has a similar action on the gastric mucous membrane and thus allays **nausea** and **discomfort**. For its powerful antispasmodic and carminative properties, it is often used to relieve **flatulent colic** and **spasmodic pains** of the stomach. It corrects the griping effect of purgatives and covers the nauseous taste of drugs. It is said to reduce the number of white corpuscles in the blood by diminishing the activity of the intestinal absorbents. The writer has heard of its controling excessive **menstrual flow**, but this requires confirmation.

MENTHÆ VIRIDIS OLEUM.

Oil of Spearmint. N. O. *Labiatæ.*

Syn. I.V.—*Pudinar tel,* Beng. *Páhári pudiná ka tel,* Hind.

Habitat.—Britain, Germany, &c.

Source and Characters.—The oil distilled from fresh flowering spearmint, *Mentha viridis.* Colorless, pale yellow or greenish-yellow when fresh, becoming darker by age. Odor and taste of the herb. Sp. gr. 0·920 to 0·940. *Solubility.*—1 in ½ of absolute alcohol and alcohol 90 p. c.

Composition.—(1) *Carvone,* a stearoptene found in oil of caraway. (2) *unoxygenated terpenes.*

Action and Dose.—The same as of peppermint.

OFFICIAL PREPARATION.

1. **Aqua Menthæ Viridis.**—1 in 1,000. *Dose.*—1 to 2 ozs. ; 1 dr. for a child 1 year old.

PHARMACOLOGY AND THERAPEUTICS.

These are similar to those of the oil of peppermint.

MENTHOL. Menthol.

$C_6H_9.OH.CH_3,C_3H_7.$

Syn.—Sometimes called Peppermint Camphor.

Habitat.—China, Japan, United States.

Source.—Obtained by cooling the oil distilled from fresh herb of *Mentha arvensis,* vars. *piperascens et glabrata,* and of *Mentha piperita.*

Characters.—Colorless acicular crystals, or crystalline masses. Odor and flavor of peppermint, producing a sensation of warmth on the tongue, and if inhaled a sensation of coldness. Melting point 107·6. F. *Solubilities.*—Very slightly in water, 4 in 1 of alcohol and 1 in 4 of olive oil.

Action.—Antiseptic, antineuralgic, local anæsthetic. **B.P. Dose.**—½ to 2 grs. in pill. Externally as a cone or pencil.

Official Preparation.

1. **Emplastrum Menthol** (altered).—1 in 6⅔. Local anodyne.

Non-Official Preparations.

1. **Mentholeate**.—Menthol 200 grs., Oliec acid ½ oz., dissolve by gentle heat in a test tube. In pruritus.
2. **Linimentum Menthol**.—Menthol 3, Chloroform 4, Olive oil *q.s.* to 16. In neuralgia, sciatica. lumbago and ringworm of the scalp.
3. **Pigmentum Menthol G.H.**—1 to 4 of olive oil. Painted into the larynx or trachea in laryngeal disease or phthisis.
4. **Tr. Menthol Etherea**.—Menthol 1, Purified Ether 8. Applied with a glass brush.
5. **Menthol Spray**.—Menthol 1, Chloroform 10, Ether 16. Local anæsthetic.
6. **Pimenthol** is obtained from American oil melting at 104 F.
7. **Po-ho-yo**.—A Chinese oil of peppermint sold as Japanese drops.

Besides the above, menthol will liquify when rubbed with thymol, phenol, chloral hydrate, camphor, and butyl chloral.

Pharmacology and Therapeutics.

Externally.—Menthol locally applied causes first stimulation, soon followed by a feeling of coldness, numbness, and **anæsthesia** of the part, and thereby relieving the pain of **neuralgias**, and other superficial pains. This is very well done by either drawing over the skin solid menthol, or by painting it with linimentum menthol, or a liquified preparation, such as, menthol cum camphor, menthol cum chloral, or by a plaster. Any painting near the eyes, causes a free flow of tears from the vapor. During hot months, the B.P. plaster liquifies and oozes through calico, or escapes by the edges of the prepared plaster, and therefore it requires hardening. The plaster or liniment is often found useful in **rheumatic** and **pleurodynic pains, lumbago** and **sciatica**. Mentholeate, alcoholic solution (1 in 8), or menthol ointment (5 to 20 grs. in 1 oz. of vaseline or simple ointment), remarkably relieves **pruritus**. The ointment has been found specially useful in **pruritus pudendi et ani.**

Menthol is also a powerful **antiseptic** and **antiparasitic**. Its alcoholic solution or liniment has given good results in **ringworm** of the scalp. The painting of an alcoholic or ethereal solution (10 to 50 p.c.) at times relieves the **inflammation of boils** and **carbuncles**. As a **snuff** (menthol 5 grs. in 1 oz. of starch, talc or oxychloride of bismuth, or along with boric acid 2, and ammon chloride 3 parts,) it has been found effective in **influenza, hay fever, catarrh** and **ozœna**.

Internally.—It relieves the pain of a carious tooth, and its alcoholic solution has been painted in **diphtheria**. The pigment (20 to 30 ms.) has been injected into the larynx for **laryngeal** and **tracheal tubercle** and **bronchiectasis** with good effects.

The anæsthetic effect lasts about 24 hours after a few injections. Menthol 1 gr. in olive oil 1 oz. has been usefully injected for thread worms. It is rarely employed internally, except occasionally as a corrigiens of griping purgative pills.

MEZEREI CORTEX. Mezereon Bark.

N. O. *Thymelaceæ.*

Habitat.—Mountainous countries of Europe, the Punjab and the Himalaya.

Source.—The dried bark of *Daphne mezereum*, *Daphne laureola*, or of *Daphne gnidium.*

Characters.—Long, thin, flattened strips or quills, tough and fibrous. Externally brown, internally whitish and silky. Inodorous. Taste acrid burning.

Composition.—(1) *Resin*, acrid. (2) *Mezereinic acid.* (3) *fixed oil*, inert. (4) *Daphnin*, a glucoside.

Action.—Rubefacient, vesicant, stimulant, diaphoretic and diuretic.

Enters into.—Liq. Sarsæ Co. Conc. (*q. v.*).

NON-OFFICIAL PREPARATION.

1. **Ext. Mezerei Æthereum B.P.** 1885.—Used in making Lin. Sinapis Co. B.P. 1885.

PHARMACOLOGY AND THERAPEUTICS.

Mezereon bark is a powerful **local irritant**, like mustard, producing first **rubefaction** then **vesication**. Lin. Sinapis Co. of B.P. 1885 which contains the ethereal extract, is yet used in acute **bronchitis** and **pneumonia**. Internally, it acts in small doses as a stimulant diaphoretic and diuretic, and is used in rheumatism and syphilis in the form of Liq. Sarsæ Co. Conc. It has never been used alone, and its efficacy is open to doubt. In large doses it is an irritant poison.

MORPHINA,

See Opium.

MORRHUÆ OLEUM. Cod-liver Oil.

N. O. *Teleostei.*

Syn. I. V.—*Mácher tel*, Beng. *Machli ká tel*, Hind.

Habitat.—Coasts of Norway, Newfoundland, France, England, Labrador.

Source.—The oil extracted from the fresh liver of the cod, *Gadus morrhua* by the application of a temperature not exceeding 180°F.; and from which solid fat has been separated by filtration at about 23°F.

Characters.—Pale yellow, with a slight fishy but not rancid odor, Sp. gr. 0·920 to 0·932. *Solubility.*—Readily in ether and chloroform, and slightly in alcohol 90 p.c.

Composition.—(1) *Olein* 72 p.c. (2) *acetin* ($C_9H_{14}O_6$). (3) *Palmitin.*

(4) *Stearin.* (5) Free *fatty acids* (oliec, palmitic, stearic). (6) *Trimethylamine.* (7) Traces of *iodine*, *bromine*, *sodium*, *calcium*, *potassium*, *iron*, *phosphoric* and *sulphuric acids*, &c. (8) Several *alkaloids*, such as, morrhuine, aselline, butyl-amine, amylamine and hexyl-amines, &c. (9) *Biliary constituents*, such as *cholesterin.* (10) *Resinous matter.* (11) *Coloring matter.* (12) *Smelling substances.*

Rancidity is due to the formation of *hydroxy-acids*, and not to the breaking up of *glycerides.* **B.P. Dose.**—1 to 4 drs.

NON-OFFICIAL PREPARATIONS.

1. **Cod-liver Oil Capsules.**—½ to 1 dr. in each. *Dose.*—1, 2 or more.

2. **Emulsio Olei Morrhuæ. B.P.C.**—1 in 2. Cod-liver oil 8 ozs., Yolks of 2 eggs, Pulv. Tragacanth. 16 grs., Elix. Glusidi 1 dr., Tr. Benzoin (simple) 1 dr., Spt. Chloroform 4 drs., Essential Oil of Bitter Almonds 8 ms., distilled Water *q.s.* to 16 ozs. Triturate tragacanth with a little oil, add yolks and stir, gradually adding water and oil alternately; transfer to a pint bottle, add the remainder previously mixed, shake well and make up to 16 ozs. *Dose.*—2 to 8 drs.

3. **Emulsio Olei Morrh. et Hypophosphitum.**—Contains calcium and sodium hyphosphites 1 p.c. each. *Dose.*—2 to 8 drs.

4. **Morrhuol.** *Syn.—Ext. Olei Morrhuæ Alcohol.*—A bitter, aromatic, yellowish-brown liquid, prepared by the evaporation of the alcoholic solution of cod-liver oil, containing the alkaloids and aromatic principles of the oil. A good substitute for the oil in cases when it is not tolerated. Each capsule contains 3 ms. which is equal to 80 ms. of cod-liver oil. *Dose.*—1 or more.

5. **Pangaduine.**—In solid crystals, representing the whole of the alkaloids contained in the cod-liver oil. It increases the flow and density of urine, and helps elimination of urea. In gout, gravel, phthisis, neurasthenia. *Dose.*—5 grs., which is equal to 5 ozs. of oil, daily.

PHARMACOLOGY.

Externally.—Cod-liver oil is a bland unirritating oil, freely absorbed through the skin.

Internally. **Gastro-intestinal tract.**—On account of its fishy, unpleasant smell, many patients can not retain it, and with some it creates indigestion. In large doses, it may cause diarrhœa, the oil being expelled in the stools. Experimentally, it has been proved that cod-liver oil is more rapidly absorbed than other oils, fats, butter, ghee, &c. It is also better digested, because the free acids it contains no doubt facilitate its emulsification and saponification, by its admixture with the alkaline secretions of the pancreas, the intestinal gland and bile. Along with the cod-liver oil, other oils and nitrogeneous elements of the food, are helped in their digestion, and are also better absorbed by the lacteals. Thus, it acts as a general **digestive agent.** Bile no doubt plays an important part in the absorption of all fats and oils, for it has been found from experiments, that fats pass with difficulty through moist animal membranes, but readily through them if moistened with bile The biliary constituents contained in the oil itself also aid its absorption, but many authorities deny their presence, saying that they are insoluble in oil.

Blood.—Cod-liver oil is said to enrich the quality of the blood, especially that of the corpuscles, which are augmented. This is due to the absorption of the fatty principles and other constituents of the oil. Therefore it is a **hæmatinic**.

Tissues and metabolism.—Cod-liver oil is not only quickly absorbed, but readily assimilated, imparting more nutrition to the cells, than what can ordinarily be done by other oils and fats. It is therefore reckoned more as a **food** than a medicine. Iodine, bromine, phosphorus, &c. performing their share of actions secondarily when continued for a long period. Hence, it must be understood, that the specific action of cod-liver oil depends more upon its fatty constituents than on the extraneous constituents it contains. It also oxidises readily in the tissues, checks the wastage of other nitrogenous elements, and promotes healthy cell-formation; hence is the explanation of the increase of **body-weight** during a course of cod-liver oil treatment. In fact, cod-liver oil differs from other oily and fatty substances, in its (1) rapid absorption, (2) quick assimilation, (3) ready oxidation, (4) imparting better nutrition, and (5) promoting altered and more healthy cell-growth. Therefore, many morbid conditions of the system due to faulty assimilation and intra-oxidation are slowly removed by it; hence it is an excellent **alterative tonic.**

Elimination.—It is mostly absorbed, a little is expelled in the fæces. Some of the acid ingredients escaping through the skin may produce a sort of acne.

THERAPEUTICS.

Externally.—If the oil is not retained, or creates indigestion or diarrhœa, inunction of oil is a capital method for introducing it into the system. 2 to 4 drs. rubbed into the skin after a hot-bath, or a particular part after washing it with soap and hot water, give at times very striking results. Wasting diseases of children are specially benefited by this method, the only drawback being its objectionable odor.

Internally.—It is of signal service in all sorts of chronic wasting diseases dependent on malnutrition and malassimilation, especially so in **scrofulous disease** in its various forms, and **phthisis. Rickets, caries of bones, chronic joint disease,** *e.g*, rheumatic or scrofulous arthritis, long **continued suppuration, chronic eczema, lupus, psoriasis, tertiary syphilis, chronic bronchitis, whooping cough, emphysema, asthma, general debility** due to under-feeding, exhaustion, overwork, &c., **convalescence** from acute illness, *e. g.*, pneumonia, &c., are benefited under its course. Some authorities even go so far as to assert that it cures some forms of phthisis. As a nourisher and restorer of nerve cells, it has been found to be of great value in many **nervous disorders** due to old age, debility or exhaustion, such as mental irritability, despondency, neurasthenia, hysteria, chorea, neuralgia, headache, &c. Sometimes constipation yields to it. Many of the above diseases are remarkably benefited by the combination with iron and iodine or quinine and hypophosphites.

Contra-indications.—Indigestion, nausea, vomiting eructation, diarrhœa, gastric catarrh, high temperature, severe hæmoptysis, primary or induced, contra-indicate its use.

Dose and mode of administration.—It should always be **begun in small doses**, say 1 dr., unless it is desired that the surplus quantity would act as a mild laxative. It should be gradually increased to 4 drs. and **always given after food**, twice or thrice daily. In rare instances, the maximum dose requires to be increased. In the beginning, say for one week, it is a good plan to give only one dose a day preferably after dinner.

Brown oil is superior to pale oil ; because it contains more fatty acids, but its disagreeable smell and taste are a drawback. Children generally can take it better, or soon get accustomed to its taste, but in the majority of cases a pleasant combination becomes necessary. Saponification should be avoided on account of the chemical changes that would occur with the fatty acids contained in the form of glycerides, in fact, the great *point is to preserve these acids absolutely unchanged.* Hence, **emulsification**, as in Emulsio. Olei Morrhuæ. B.P.C., is only to be recommended. It can be extemporaneously emulsified by gum acacia or tragacanth, sweetened by glycerin and flavored by lemon or bitter almond oils. It can also be given in **flexible capsules**, mixed with isinglass, jelly, or still better with extract of malt. Some patients prefer to take it on milk, coffee, wine, or orange juice. A pinch of salt placed on the tongue, a cut lemon sucked, a piece of fresh ginger well chewed and some of the juice swallowed, before and after the dose, effectively remove the nauseous taste in many instances. To help its emulsification as well as to stimulate the pancreatic secretion, purified ether (10 to 20 ms.) is sometimes combined with it.

If the oil disagrees, morrhuol or wine of cod-liver oil, which is but a solution of morrhuol may be given instead. When no method can be found by which the oil can be retained and digested, **inunction** is the last resource (see page 439). It is sometimes injected subcutaneously.

MOSCHUS. Musk. N. O. *Ruminantia.*

Syn. I. V.—*Mrigandvi*, *Kasturi*, Beng., Sans. *Kasturi*, Hind.

Habitat.—Central Asia, Thibet, exported to Europe from Bengal and China.

Source.—The dried secretion from the preputial follicles of *Moschus moschiferus.*

Characters.—In irregular, reddish-brown or reddish-black somewhat unctuous grains. Odor characteristic, persistant, taste somewhat bitter. Contained in an oval sac, 1½ to 2 in. in diameter, nearly smooth on one side, covered on the other or outer side by brownish-yellow or greyish appressed bristle-like hairs concentrically arranged around a central orifice. *Impurities.*—Dried blood, catechu, earthy matter, cinnabar, pieces of leather, &c. The sac is so ingeniously filled and stitched that the contents cannot be made out unless it is cut open.

Tests.—Should be free from earthy matters, and on incineration should not yield more than 8 p.c. of ash. There is considerable moisture amounting to about 30 p. c. The spurious sac has no aperture and the hairs are not so well arranged circularly, and there is no trace of penis, which is found in every genuine pod.

Composition.—(1) An *aromatic principle* with unknown composition. (2) *Inactive substances*, such as fixed oils, fats, salts, &c. Complete drying removes the odor, but it returns when moistened with water.

Action.—Stimulant and antispasmodic. **B.P. Dose.**—5 to 10 grs. in pill or emulsion.

NON-OFFICIAL PREPARATIONS.

1. **Mistura Moschi.**—Musk 9 grs., Acacia 9 grs., Sugar 9 grs., Rose water 1 oz. *Dose.*—½ to 1 ounce or more.
2. **Tr. Moschi.**—Musk 6 grs., Alcohol (90 p.c.) 1 ounce. Digest for 7 days, and strain. *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Musk is known to be a powerful **diffusible stimulant** to the **cardiac, respiratory** and **nervous** systems. Whether this action is a **reflex** stimulation from the nose, mouth and stomach, or is due to **direct** influence on the cardiac and respiratory centres, and the cells of the brain, is not known; perhaps to both. In moderate doses, it may cause giddiness, heaviness of the head, headache, dryness of the gullet, eructations, sometimes nausea, followed by sleepiness or faintness. In large doses, it may produce tremor and convulsions. It is an **antispasmodic.** It is excreted in the urine and sweat, and the unabsorbed portion passes out with the stools, which are imbued with its odor.

Musk is chiefly used to sustain and strengthen the failing heart and pulse in **adynamic febrile** and **other diseases**, such as, low **remittent, typhus**, and **typhoid** fevers, **pneumonia**, &c. It is a mistake to use it as a last resource, when the vital powers are fast fading away. To be of use, the dose is to be repeated frequently, as it is soon excreted. Trousseau extols it in **drunkard's pneumonia**, and Wood recommends it in **delirium tremens.** Ten drops every ¼ hour for 4 to 6 doses, remove **cardiac dyspnœa**, and induce sleep. It was employed in melancholia, hysteria, chorea, whooping-cough and epilepsy, but is scarcely used now. The tincture has been found by the writer to check some forms of hiccough, and, in combination with strophanthus, to remove palpitation of hysterical subjects.

It is best given in a **mixture**, as the mistura moschi, **pill** or **linctus** made with camphor and honey.

It is the only stimulant used by the native *Kavirajes* who practise the ancient Hindu System of medicine.

MYLABRIS. Mylabris. N. O. *Coleoptera.*

(Ind. and Col. Addendum.)

Syn.—The Telini Fly. **Syn. I.V.**—*Telini-poká*, Beng. *Telini-makhi*, Hind.

Habitat.—India, Eastern and African Colonies.

Source.—The dried beetle of *Mylabris phalerata.*

Characters.—About 1 in. long, $\frac{3}{8}$ in. wide. The elytra long, black, with two broad zig-zag, orange colored transverse bands, and a large orange-colored spot at the base. A pair of brown membranous wings.

Composition.—*Cantharidin*, active principle.

OFFICIAL PREPARATIONS.

1. **Acetum Mylabridis.**—1 in 5 of Glacial Acetic Acid and 5 of Water.
2. **Emplastrum Calefaciens Mylabridis.**—See page 21. Substitute Mylabris for Cantharis.
3. **Emplastrum Mylabridis.**—See page 21. Substitute Mylabris for Cantharis.
4. **Liquor Epispasticus Mylabridis.**—1 in 2 of Acetic Ether. See page 32. Substitute Mylabris for Cantharis.
5. **Unguentum Mylabridis.**—1 in 10 of Benzoated lard. See page 58. Substitute Mylabris for Cantharis.

PHARMACOLOGY AND THERAPEUTICS.

The action and uses of mylabris are precisely the same as those given for cantharis. (See p. 307.)

MYROBALANUM. Myrobalan.

N. O. *Combritaceæ.*

(Ind. and Col. Addendum.)

Syn.—Chebulic Myrobalans. **Syn. I. V.**—*Haritaki*, Beng. *Hara*, Hind. *Haritaki*, *Abhoya*, Sans.

Habitat.—India and Eastern Colonies.

Source.—The dried immature fruits of *Terminalia chebula.*

Characters.—About $\frac{1}{3}$ to $\frac{3}{4}$ in. long, $\frac{3}{8}$ in. wide, ovoid or fusiform like an olive, but shrivelled longitudinally; black, solid and brittle, with shining fracture. Taste very astringent.

Composition.—(1) *Gallo-tannic acid*, about 25%. (2) *Gallic acid.* (3) resin, &c.

There are two varieties of *Terminalia chebula* met with in the bazars; one known as *jangi haritaki*, the unripe but dried fruits of the above named plant. The other variety is *haritaki* so common in the bazars, is the dried mature fruit of the same plant.

Action.—Astringent, alterative and tonic. **B.P. Dose.**—$\frac{1}{2}$ to 1 dr.

OFFICIAL PREPARATIONS.

1. **Unguentum Myrobalani.**—1 in 4 of Benzoated lard.
2. **Unguentum Myrobalani C. Opio.**—Myrobalan ointment 925, Opium in powder 75.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—These fruits were highly extolled by the ancient Hindu physicians as powerful astringent, stomachic, tonic and alterative. In olden times they held a prominent place amongst the masticatories and even now many habitually use them with no troubles to the organs of mastication. The powdered fruits form an important ingredient of tooth powder, which when regularly used prevents the teeth from premature fall and decay. It is also a valuable remedy for **spongy** and **ulcerated gums**, and acts as a gentle **purgative.** One or two fruits taken daily at bed time keep the bowels very regular, giving one or two evacuations in the morning. On account of the astringent and aperient properties, myrobalans, especially of the smaller variety, *(Jangi haritaki)* are very useful in **diarrhœa** and **dysentery.** Owing to the large amount of tannin which they contain, they are of great service as **lotions** and **injections** and may be substituted with advantage for **Galls.** They can also be chewed with benefit to remove the after taste of nauseous drugs. *Jangi haritaki* fried in a little good *ghee*, and then soaked in the sun for about a week with lime juice and black salt, is a well-known domestic remedy.

MYRISTICA. Nutmeg. N.O. *Myristicaceæ.*

Syn. I. V.—*Jaiphal*, Beng. *Jaiphal, Jati, Jaintri*, Hind.

Habitat.—Banda islands of the Malayan Archipelago ; Malabar and Ceylon.

Source.—The dried seed of *Myristica fragrans*, divested of its testa.

Characters.—Ovoid, about 1 in. long. Externally greyish-brown, with reticulated furrows. Internally greyish-red, marbled with brownish-red veins. Odor strong, aromatic. Taste aromatic, warm, bitter,

Composition.—(1) Fixed or Concrete oil, 30 p.c. (2) *Volatile oil*, 4 p.c. (3) Starch, &c.

Action..—Stimulant, carminative, narcotic. *Dose.*—5 to 20 grs.

Enters into.—Pulv. Catechu Co., Pulv. Cretæ Aromat., Spt. Armoraciæ Co., Tr. Lavend. Co.

OLEUM MYRISTICÆ. Oil of Nutmeg.

Source and **Characters.**—A pale-yellow oil, distilled from nutmeg, having the odor and taste of nutmeg. *Solubility.*—1 in 4½ of alcohol 90 p.c.

Composition.—(1) *Myristicin*, a terpene. (2) *Myristicol.*

B.P. Dose.—½ to 3 ms. on sugar or in pill.

Enters into.—Pil. Aloes Soc., Spt. Ammon. Aromat., Tr. Guaiaci Ammon., Tr. Valerian. Ammon., and the

OFFICIAL PREPARATION.

1. **Spiritus Myristicæ** (altered).—1 in 10. **B.P. Dose.**—5 to 20 ms. *Enters into.*—Mist. Ferri Co.

NON-OFFICIAL PREPARATION.

1. **Oleum Myristicæ Expressum.** *Syn.—Adeps Myristicæ.*—A concrete oil obtained by expression and heat. Diluted with a bland oil or soap liniment, it is a useful application to sprains, rheumatism, paralysis, &c.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The volatile and the fixed oils are used for perfuming pomades and lotions for the hair, and diluted with olive oil or soap-liniment as an embrocation in **chronic rheumatism.** The expressed oil is said to possess antiseptic and antiparasitic properties. Nutmeg made into a paste is sometimes used by the natives to remove headache and neuralgia.

Internally.—For its agreeable aroma it is used in cooking. Both the kernel and the volatile oil are **gastric stimulants,** increasing the flow of gastic juice, and **carminatives,** expelling intestinal flatus ; hence they can be used in **dyspepsia, cramps** and **flatulence.** The volatile oil relieves toothache, and the kernel is chewed to remove fœtor of breath. An infusion of nutmeg is said to allay the thirst of cholera patients. In large doses, it acts as a **powerful narcotic,** causing giddiness, vertigo and coma, symptoms resembling those that follow poisonous doses of camphor.

MYRRHA. Myrrh. N. O. *Burseraceæ.*

Syn. I. V.—*Gandharasha, gandhabal, Bol,* Beng. *Bola,* Sans. *Bol,* Hind.

Habitat.—Somali Land, Arabia Felix, and Western India.

Source.—A gum resin obtained from the stem of *Balsamodendron myrrha,* and probably other species.

Characters.—In rounded or irregular tears or masses of agglutinated tears, varying in size, reddish-brown or reddish-yellow, dry, brittle, covered with a fine powder ; fractured surface irregular, somewhat translucent, brown, oily, with whitish marks. Odor agreeable, aromatic. Taste aromatic, bitter, acrid. Partly soluble in water, resin soluble in alcohol. *Impurities.*—Resins and gum-resins, false myrrh. Bombay is the chief myrrh market. The best quality is the *Karam* myrrh.

Composition.—(1) *Gum,* 60 p. c. (2) *Myrrhin,* a resin 23 p. c. (3) *Myrrhol,* a volatile oil. (4) A bitter principle.

Action.—Stomachic, carminative, emmenagogue. *Dose.*—10 to 30 grs.

Enters into.—Decoct. Aloes Co., Mist. Ferri Co., Pil. Galbani Co., Pil. Rhei Co. and the

OFFICIAL PREPARATIONS.

1. **Pilula Aloes et Myrrhæ.**—(See Aloes, p. 220).
2. **Tinctura Myrrhæ.**—1 in 5. **B.P. Dose.**—½ to 1 dr. in emulsion.

NON-OFFICIAL PREPARATIONS.

1. **Gargarisma Myrrhæ.**—Tr. Myrrh. 1, Honey 1, Inf. Rosæ 18; mix.
2. **Tr. Myrrhæ et Boracis.**—See Borax, page 179.

PHARMACOLOGY.

Externally.—Like other oleo-resins, locally, myrrh is a mild **disinfectant, stimulant** and **alterative** to the ulcerated and mucous surfaces.

Internally. **Gastro-intestinal tract.**—The same action is noticed in the mouth, throat, stomach and bowels. It promotes appetite, excites gastric secretion and peristalsis of the stomach and intestines, and is therefore a **stomachic** and **carminative.**

Blood.—It **increases** the number of **leucocytes**, perhaps by stimulating lacteal activity. It stimulates phagocytosis.

Elimination.—It is excreted by the mucous membranes, especially those of the **respiratory** and **genito-urinary** tracts, which it stimulates and disinfects; hence it is a **stimulant expectorant, emmenagogue**, and **uterine stimulant.**

THERAPEUTICS.

Externally.—Myrrh is sometimes used by the natives of India as a dressing for foul ulcers, or dissolved in human milk as a collyrium for purulent conjunctivitis.

Internally.—Myrrh makes a capital mouth-wash (Gargarisma Myrrh.) for **aphthous and ulcerated** tongue, **relaxed throat** and **spongy gums.** Its efficacy is increased if combined with borax, as in Tr. Myrrh. et Boracis. For **receded** and **ulcerated gums**, Tr. Myrrhæ and Tr. Iodi make a superior preparation. For its stomachic and carminative properties, it is often used as an **adjunct** of purgatives in **dyspepsia, constipation, chlorosis**, &c. Combined with iron, it is very effective in **anæmia.** As a disinfecting expectorant, it is occasionally given in **chronic bronchitis** and **bronchiectasis**, and as a stimulant alterative to the mucous membrane, in **cystitis** and **leucorrhœa.** For its emmenagogue property it is largely prescribed in **amenorrhœa**, in conjunction with aloes and iron. Some however doubt its emmenagogue action. Recently, Dr. Stroll (Munich) has used the tincture in **diphtheria** with marvellous success. He treated 80 cases with only 1 death by Tr. myrrh 1, glycerin 2, water 47 parts.

NAPHTHOL. Beta-Naphthol. $C_{10}H_{72}OH$.

Syn.—Naphtol U.S.P. Beta-mono-hydroxy-naphthaline.

Source.—Prepared from naphthaline-sulphonic acid.

Characters.—White crystalline laminæ or powder, with phenol-like odor, and pungent taste. *Solubility.*—Nearly insoluble in water, 1 in 2 of alcohol (90 p. c.), 1 in 12 of olive oil, 1 in 40 of glycerin.

Action.—Powerful antiseptic and intestinal disinfectant. **B. P. Dose.**—3 to 10 grs. in cachets or pills.

NON-OFFICIAL PREPARATIONS.

1. **Alpha-Naphthol.** *Syn.—Ortho-Naphthol.*—Has 3 times the antiseptic property of *B*-Naphthol. More soluble, less toxic, but more irritant. As an intestinal wash, 5 grs. in 1 quart. of water. Shoemaker found it useful in gonorrhœa and gleet.

2. **Alphol.**—A salicylate of a-naphthol ether. Whitish soluble powder. Acts like salol and betol in articular rheumatism and cystitis.

3. **Asaprol.** *Syn.—Arastol.*—Obtained by acting on *B*-naphthlsulphonic acid with calcium carbonate. Acts like sodium salicylate in rheumatism and neuralgia, and as an antiseptic in dyspepsia. Praised as an intestinal hæmostatic. It is a test for albumen in urine. The test solution is made by adding 1 part of strong hydrochloric acid to 10 of a 10 p.c. watery solution of Asaprol. 10 drops of this to 1 dr. of urine precipitates albumen, albomoses and peptones. All other precipitates are *dissolved* on boiling, *except* that of albumen.

4. **Benzonaphthol.** *Syn.—Benzoyl-Napthol.*—A whitish tasteless insoluble powder. Intestinal antiseptic and diuretic, splitting up into *B*-naphthol and benzoic acid in the intestines. In dyspepsia and typhoid fever. *Dose.*—5 to 15 grs.

5. **Betol.** *Syn.—Naphthalol, Napthosalol.*—A salicylate of *B*-naphthol-ether, in tasteless white crystals, insoluble in water. Splits up into salicylic acid and naphthol in the system. Used in rheumatism and cystitis. *Dose.*—3 to 8 grs.

6. **Lactol.**—A *B*-naphthol lactate. More soluble. Acts like benzonaphthol.

7. **Microcidine.**—Obtained by fusing *B*-naphthol with caustic soda. Whitish, non-toxic soluble powder. Used for lotions and dressings.

8. **Naphthalene.** *Syn.—Naphthalin.*—A coal tar derivative in white rhomboid crystals insoluble in water. A powerful antiseptic and germicide. Moulded into sticks or blocks, it is sold as *Alabastrine*, moth preventive, *Camphylene*, a stable and urinal disinfectant, &c. Is used externally and internally. As an intestinal disinfectant in dysentery, catarrhal, typhoid and phthisical diarrhœa. 10 to 20 p.c. solution in oil cures scabies.

9. **Naphthol C. Camphora.**—*B*-naphthol 1, Camphor 2. A viscid liquid, miscible with oil. A powerful non-toxic antiseptic for wounds and diphtheritic membrane. An intra-pulmonary injection was given with benefit in 3 out of 4 cases.

10. **Quinaphthol.**—Quinine-Beta-naphthol-sulphate. Yellow crystals sparingly soluble in water. A harmless intestinal antiseptic in typhoid fever. *Dose.*—8 to 10 grs.

11. **Ung. Naphthol.** *Syn.*—Kaposi's ointment.—*B*-naphthal 1 dr., lard 1 oz., mist.

PHARMACOLOGY AND THERAPEUTICS.

Naphthol without a prefix should mean *B*-naphthol not *a*-naphthol. It is a powerful **antiseptic** and **disinfectant**, both externally and internally. In **scabies, ringworm, psoriasis** and **chronic eczema**, the ointment having less unpleasant odor may be used with success instead of tar, which it resembles in action. Internally it is chiefly used for its gastro-intestinal antiseptic property in **dyspepsia, pyloric obstruction, diarrhœa, dysentery, cholera** and **typhoid diarrhœa**, especially in the last. The action on the gastro-intestinal canal is local. Most of the drug is excreted in the fæces, only a little being absorbed. If it is largely absorbed, it may cause vomiting, insensibility, nephritis or hæmaturia. It is found in the urine unaltered. It may be given in *cachets* or *pills*, or as an *emulsion* dissolved in oil. The pills may be coated with keratin.

Many of the recent preparations enumerated above are scarcely used.

Benzo-Naphthol is a very valuable remedy in the treatment of **psilosis** and also, in combination with resorcin, in the **inflammatory diarrhœa of children.**

NUX VOMICA. Nux Vomica. N O. *Loganiaceæ.*

Syn.—Poison-Nut. **Syn I. V.**—*Kuchila*, Beng. Hind.

Habitat.—East Indies (India, Ceylon, Cochin China).

Source.—The dried ripe seeds of *Strychnos nux vomica.*

Characters.—Disc-shaped, ¾ to 1 in. in diameter, ¼ in. thick, concavo-convex or flat; rounded or somewhat acute at the margin, where there is a small prominence from which a raised line passes to the central hilum. Surface ash-grey covered with short satiny hairs. Endosperm large, horny. Cotyledons small, leafy. Taste intensely bitter. No odor. The *St. Ignatius' Beans* are the seeds of *Strychnos Ignatia*, they are olive-shaped, and contain more strychnine.

Identification.—It resembles no other drug in the B. P. The satiny appearance, the color, and the flat and circular button-like shape will at once distinguish it.

Composition.—(1) *Strychine*, 0.2 to 0.5 p. c. varying in different seeds. (2) *Brucine*, 0.5 to 1 p. c. (3) *Igasuric acid*, with which strychnine and brucine are united. (4) *Loganin* a glucoside. (5) *Igasurine*, another alkoloid like the other two. (6) Fat and sugar.

Action.—General tonic and spinal stimulant. **B. P. Dose.**—1 to 4 grs. in powder or pill.

OFFICIAL PREPARATIONS.

1. **Extractum Nucis Vomicæ** (altered and standardized).—Strychnine 5 p. c. Has ⅔ the alkaloidal strength of the extract of B. P. 1885. **B. P. Dose.**—¼ to 1 gr. in pill.
2. **Extractum Nucis Vomicæ Liquidum** (new).—Strychnine 1½ grs. in 110 ms. **B. P. Dose.**—1 to 3 ms.
3. **Tinctura Nucis Vomicæ** (altered).—Strychnine ¼ gr. in 110 ms. **B. P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Inf. Nucis Vomicæ** (Ind. Pharm.).—Bruised seeds 2 drs., boiling water 2 ozs., infuse 1 hour. A valuable bitter tonic, to be used with caution. *Dose.*—$\frac{1}{2}$ oz., to be gradually increased to 1 oz.

2. **Brucine.**—In whitish, bitter, acicular crystals, resembling strychnine in pharmacology and therapeutics, but being weaker and eliminated sooner. It greatly increases the **reflex** activity of the spinal centres. Recommended in epilepsy in $\frac{1}{20}$ gr dose, gradually increased to $\frac{1}{2}$ gr. It is difficult to get it free from Strychnine. May be given in solution in water, and spirit, or in pill.

STRYCHNINE. Strychnine.

$C_{21}H_{22}N_2O_2$.

Source.—An alkaloid obtained from the dried ripe seeds of Strychnos Nux-vomica and other varieties of Strychnos.

Characters.—Colorless, inodorous, trimetric prisms. *Solubility.*—1 in 150 of cold water, but according to Squire 1 in 6000 to 8000 of water, 1 in 160 of alcohol 90 p. c. ; 1 in 6 of chloroform. *Impurities.*—Brucine and mineral matter.

Tests.—(1) Watery solution is intensely bitter. (2) Sulphuric acid forms a colorless solution, which on addition of potassium bichromate acquires a violet hue speedily passing through red to yellow. (3) Sulphuric acid containing $\frac{1}{2000}$ part of potassium permanganas gives a violet color with a minute particle of strychnine. (4) Not colored by nitric acid (absence of brucine, which is colored blood-red).

Resembles.—Larger forms of crystals of salicylic acid but can be detected by the above tests and by the general appearance.

B.P. Dose.—$\frac{1}{60}$ to $\frac{1}{15}$ gr. in pill, well triturated with milk of sugar, or preferably in solution.

Enters into.—Syr. Ferri Phosph. c. Quin. et Strychnina. (see page 390).

STRYCHNINÆ HYDROCHLORIDUM.

Strychnine Hydrochloride. $C_{21}H_{22}N_2O_2, HCl2H_2O$.

Syn. B.P. 1885.—Hydrochlorate of strychnine.

Source and characters.—Obtained from nux-vomica and other species of Strychnos. Small colorless, trimetric prisms, which effloresce in the air, very bitter. *Solubility.*—1 in 35 of water, or 1 in 60 of alcohol. *Impurities*—Sulphates.

OFFICIAL PREPARATION.

1. **Liquor Strychninæ Hydrochloridi.**—1 gr. in 110 ms. **B.P. Dose.**—2 to 8 ms. *i. e.* $\frac{1}{55}$ to $\frac{1}{14}$ gr. of strychnine hydrochloride.

NON-OFFICIAL PREPARATIONS OF STRYCHNINE.

1. **Strychninæ Acetas.**—Colorless acicular crystals, imperfectly soluble in water. Alterative, antitubercular. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

2. **Strychninæ Arsenas.**—Small white acicular crystals, soluble 1 in 29 of water. *Dose.*—$\frac{1}{80}$ to $\frac{1}{15}$ gr.

3. **Strychninæ Hydrobromidum.**—White crystals. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

4. **Strychninæ Nitras.**—Hard colorless needles, soluble 1 in 67 of water. Successfully used in nocturnal incontinence of urine, amaurosis, chorea, gastralgia, gastrodynia. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr. Hypodermic solution.—1 gr. in 100 ms. of water, dissolved by gentle heat ; *dose.*—2 to 6 ms.

5. **Strychninæ Sulphas.**—Prismatic. Soluble 1 in 62 of water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

6. **Hypodermic Tablets.**—Contain $\frac{1}{100}$, $\frac{1}{30}$, $\frac{1}{60}$ gr. each of the sulphate.

7. **Strychninæ Hypophosphis** (Merck).—White powder, soluble in water. In tuberculosis and wasting diseases. *Dose.*—$\frac{1}{30}$ to $\frac{1}{12}$ gr.

PHARMACOLOGY.

Externally.—Strychnine is a powerful **antiseptic**, while brucine is a local anæsthetic.

Internally. **Gastro-intestinal tract.**—Being intensely bitter, both nux vomica and strychnine are typical **stomachics** and **tonics**, increasing the secretion of the gastric juice, and thereby sharpening appetite and promoting digestion like gentian, calumba, &c., but more powerfully. They **increase the peristaltic movements of the intestines**, and may thus act as **purgatives**.

Blood.—Strychnine enters the blood from the mucous membrane or when given hypodermically. It is not yet known what effect it has on the living blood corpuscles, though the blood mixed with strychnine and shaken with air contains more oxygen and less carbonic acid.

Heart and circulation.—The heart is **powerfully stimulated** by influencing (*a*) the **cardiac centre**, and (*b*) the **cardiac muscle**. In minute doses it strengthens the heart-beats. The **blood-pressure is greatly raised**, partly by the (*a*) direct stimulation of the vaso-motor centre, thus contracting the vessels all over the body ; (*b*) by the indirect or asphyxial stimulation of the vaso-motor centre, due to the saturation of the blood with carbonic acid ; and (*c*) by the obstruction to the circulation from peripheral resistance from muscular spasms. The heart beats for a while after the respiration has stopped, but remains contracted after death.

Respiration.—It powerfully **stimulates** the **medullary and spinal respiratory centres**, rendering the respiration **quicker** and **deeper**. The latter becomes so active after the administration of strychnine, that if the cord of an animal is cut below the medulla, the respiration is not entirely stopped, as usually happens ; again, if the drug is given after the section of the cord, respiration returns. The respiratory muscles participate in the general tetanus, and the patient dies asphyxiated from the rigidity of the thoracic muscles and diaphragm.

Temperature rises slightly during the convulsions.

Brain.—The convolutions are not affected, the mind remaining clear till the last. In minute doses, it is said to **strengthen** the **mental powers**, and to **sharpen** the **senses** of sight, smell and hearing, perhaps by stimulating the **sensory nerve centres.**

Medulla and cord.—Strychnine excites the three important centres in the medulla, *viz.*—(1) the **respiratory**, (2) the **cardiac** and (3) the **vaso-motor**. In large doses it produces **tetanic convulsions**, which are entirely due to the **great excitability of the motor nerve cells of the spinal cord** and exaggeration of the conductive power of the cord generally. It has been experimentally proved that these convulsions are not caused by the stimulation of the cerebrum, the motor and sensory nerve trunks, and the muscles. The **reflex excitability** is heightened so much, that the slightest stimulus, as a breath of air, or a loud sound, is enough to cause spasms.

Nerves and muscles.—The motor nerves and the muscles are unaffected, but in toxic doses, the functional activity of the motor nerves is depressed towards the end. This is not due to the exhaustion of the nerve tissue as has been supposed, but to the direct action of the drug on the nerves themselves. In moderate doses, its local application stimulates local, motor and sensory nerves.

Genital organs.—In moderate doses, it produces sexual desire, and is therefore called an **aphrodisiac**

Elimination is very slow, the drug clinging to the viscera, especially the brain, for days together. If the dose, however small, is frequently repeated, it accumulates in the body, hence strychnine is **cumulative**. It is eliminated in the urine, partly unchanged, and partly as a strychnic acid.

Toleration.—Some persons are more tolerant than others. Some of the natives of India are in the habit of taking nux vomica morning and evening with *pan*, commencing with ⅛ gr. they sometimes increase it to about 20 grs. (an entire nut).

Toxic action.—Within ½ to 1 hour after a large and poisonous dose, the symptoms of poisoning commence. General uneasiness and soreness of the limbs, instantly followed by shooting pains in the back and then down the arms and legs are first observed. Tetanic convulsions of the muscles soon set in, lasting for ½ to 1 minute when they relax, leaving the patient sweating and exhausted. They come on again and again and the intermission gets shorter and shorter as the severity of the symptoms increase. The muscles of the jaw are only affected before death, **not in the beginning**. In short, the symptoms of poisoning closely resemble those of tetanus, from which they differ in (1) their rapid development, (2) want of a history of a wound, operation, &c., as in tetanus, (3) complete relaxation between the spasms in strychnine poisoning, whereas in tetanus the muscles of the back and jaw remain rigid between the spasms. (4) Trismus or "lock-jaw" only appears as a late symptom, whereas it is the first symptom in tetanus, (5) death taking place soon, or the symptoms rapidly declining. Half a grain is known to be the lowest dose that has proved fatal.

Antidotes.—Pump before convulsions, or under chloroform after convulsions; apomorphine $\frac{1}{10}$ to $\frac{1}{5}$ gr. subcutaneously, or emetics: charcoal, tannin in large quantities, solution of iodine; potassium bromide (2 drs. to 2 ozs.) with chloral hydrate (30 to 60 grs.) repeated if necessary; morphine, alcohol in poisonous doses (Whitla): chloroform or amyl nitrite inhalation, artificial respiration, &c.

Antagonists.—Chloral and morphine are not strict antidotes to strychnine as they act on the cerebrum. Gelseminum and calabar bean are more suitable.

Methyl and Ethyl compounds of Strychnine and Brucine.—Remarkable results have been obtained by Drs. Fraser and Crum Brown when strychnine and brucine were combined with **methyl** and **ethyl** radicals. These new compounds **lose** their **convulsant** action, which they ordinarily possess when uncombined, and produce **general paralysis** of the body by acting on the ends of the motor nerves, like curare. In poisoning by any of these compounds, the heart continues to beat normally for a long time, and the muscles of the body remain for hours flaccid and contractile. Hence, ethyl and methyl compounds of strychnine and brucine may be injected in strychnine poisoning as antidotes.

Therapeutics.

Externally.—Strychnine is too poisonous to be used on an abraded surface. Mustard oil, in which some nux vomica seeds have been fried, has been used by the writer as a stimulant local embrocation over paralysed muscles.

Internally. **Gastro-intestinal tract.**—Nux vomica and strychnine are a highly prized remedy for promoting appetite and digestion in **atonic dyspepsia**, and **weakness of digestion** during convalescence from acute illness, such as fever, pneumonia, bronchitis, &c. Tr. nucis vomicæ or liqr. strychnini hyd. dil. and infusion of calumba or infusion of gentian, makes a very efficient prescription for such cases. **Acidity**, **heartburn**, or **flatulence** is frequently relieved if the tincture is given $\frac{1}{4}$ hour before food. Strychnine has given satisfactory results in acute and chronic **gastric catarrh**, and **gastralgia** ($\frac{1}{100}$ gr. hypodermically). Because it increases peristalsis, nux vomica has been frequently given as an adjunct to other purgatives Sometimes it corrects **constipation** without the aid of other remedies. Strychnine has been found to cure **prolapsus ani**, especially if associated with constipation.

Heart and circulation.—As a cardiac and vascular stimulant and tonic, both nux vomica and strychnine are invaluable in **cardiac failure** or in urgent **failing compensation**, from whatever source it may arise. It may advantageously be combined with cafeine or digitalis according to the nature of the case In urgent cases, strychnine ($\frac{1}{30}$ gr.) must be hypodermically injected. In fact, it is the only reliable drug to tide over the danger rapidly.

Hypodermic injection sometimes cures collapse due to cholera or snake bite. According to Anstic, it cures coldness of hands and feet. In **narcotic** and **chloroform** poisoning strychnine injection keeps up the action of the heart and respiration.

Respiration.—Strychnine helps expectoration by strengthening the expulsive force, and stimulating the respiratory centre, as in **chronic bronchitis, protracted pneumonia, phthisis, emphysema**, &c. It may advantageously be given along with expectorants It checks **phthisical night sweats**, perhaps by stimulating the respiratory centre, and averts death in **chloroform poisoning** ($\frac{1}{30}$ gr. hypodermically).

Nervous System—As a powerful spinal stimulant, it is mainly used in diseases of the nervous system.

1. **Paralysis**.—Strychnine is of signal service in (*a*) **paresis** or **incomplete paralysis**; (*b*) **functional paralysis** or **paralysis of reflex origin**, as facial palsy, hemiplegia, paraplegia, &c.; (*c*) **local paralysis**, as that of the forearm, larynx, sphincter, eyes, due to any toxic agent, as lead, alcohol or tobacco, (intramascular subcutaneous injection $\frac{1}{30}$ to $\frac{1}{20}$ gr. sometimes gives excellent results); (*d*) **diphtheritic paralysis**; (*e*) **infantile paralysis**. But the following conditions contraindicate its use :—(*a*) When the paralysis is of recent origin. (*b*) When rigidity of muscles still exists. (*c*) When there is much wasting of muscles (Sometimes, progressive muscular atrophy is stayed in its progress by the hypodermic injection of $\frac{1}{80}$ gr. increasing to $\frac{1}{40}$ gr, given once daily). (*d*) When head symptoms are present. (*e*) And, when the muscles do not respond to electricity. The results obtained in the treatment of nervous diseases have been very uncertain. The great point to remember is that when there is no lesion of the anterior cornua it is scarcely indicated. Moreover if there be active mischief going on in this part, stimulation by strychnine is likely to do more harm than good, always bear in mind Hilton's law of 'Rest for the inflamed organ'.

2. **Sensory paralysis**.—It is of no value in such paralysis, but the hypodermic injection in the temple sometime benefits amaurosis.

3. **Chronic nervous disorders**—The improvement that is noticed at times in chorea, neuralgia, insomnia, chronic alcoholism, is more to the improvement of digestion, than to its specific action. In hysteria accompanied with undue excitability of the peripheral sensory nerves, it is positively injurious. Strychnine relieves drink craving either given by mouth or subcutaneously.

Besides the above, nux vomica or strychnine can be successfully employed in **atonic condition of the bladder**, and **sexual debility**. Strychnine is sometimes injurious in debility from sexual excess, though bromides do good. In mental depression from over-work it should be used after the suspension of work. A drop of tincture in a teaspoonful of water given every 5 or 10 minutes for about 8 doses and then at longer intervals decidedly removes *sick-headache* (Ringer). It is said to be of immense value in obviating and controlling **post partum hæmorrhage** and **menorrhagia**.

Mode of administration.—Nux vomica and strychnine are best given as *pill* or *mixture*. Hypodermically Liqr. strych. Hydrochloride (2 to 4 ms.) or the nitrate can be used. Strychnine should not be given per rectum. Brunton recommends a good **dinner pill** with Ext. Nucis vom. ½ gr., Pulv. Ipecac ½ gr., Pil. Rhei. Co 4 gr.; m. ft. pil 1. To be taken before dinner. As a tonic after malarial fever the writer combines it with acid nitro hydrochloric dil. and infusion of chiretta as in the formula.—Tr. Nucis vomicæ 2 drs, Acid Nitro Hydrochlor. dil. 2 drs, Quin. Hydrochloride 24 grs., Spt. Chloroform 2 drs., Inf. chiretta ad. 12 oz. Mist. One ounce thrice daily ½ an hour before food.

OLEUM OLIVÆ. Olive Oil.

N. O. *Oleaceæ.*

Habitat.—South of Europe (Introduced on the Himalayas and Nilgiris).

Source.—The oil expressed from the ripe fruits of *Olea Europea.*

Characters.—Pale yellow or greenish-yellow, with faint odor and bland taste. Sp. gr. 0·914 to 0·919. Congeals partially at 32° F. *Impurities.*—Cotton seed and other oils.

Composition.—(1) *Triolein*, a fluid oil composed of oleic acid and glyceryl, 72 p.c. (2) *Tripalmatin*, a solid oil composed of palmitic acid and glyceryl, 28 p. c.

Action.—Nutritive, biliary lithontriptic and mild laxative. *Dose.*—¼ to 1 oz. or more.

Enters into.—Emp. Ammoniaci c. Hyd., Emp. Hydrargyri., Emp. Picis, Emp. Plumbi, Lint. Ammoniæ, Lint. Calcis, Lint. Camphoræ, Ung. Capsici, Ung. Hydrargyri Co., Ung. Hydrargyri, Ung. Resinæ, besides hard soap, soft soap and glycerin.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Olive oil is a bland **unirritating** fixed oil. It renders the skin soft, smooth and supple when rubbed. It is therefore an excellent **emollient** in dry skin diseases, such as **psoriasis** and **xeroderma**. It is a basis of liniments and ointments, and as a **lubricating** agent is employed in massages. It softens and aids the removal (especially when used in the form of a hot poultice) of the **scabs of eczema, favus,** &c., and protects the skin from the irritating effects of urine, fæces and acrid discharges. It checks the **debilitating sweating** when rubbed into the surface of the body. In the same way, it can be used as a **disinfecting inunction** in the disquamative stage of scarlatina, small-pox and plague, by an admixture of phenol 4 to 5 p. c. To prevent the spread of ringworm, weak carbolic oil is a capital application. Lin calcis is a soothing protective to **burns** and **scalds**. It is absorbed by the cutaneous lymphatics, and **gives nutrition** to the tissues, but not to the same extent as is done by cod-liver oil (q. v. p. 487).

Internally—As a topical demulcent, it is useful in **irritant poisoning**, except by phosphorus. In small doses, it undergoes the same changes in the intestinal canal, as cod-liver oil and is absorbed In the tissues, its action is also identical with that of cod-liver oil, with the differences already alluded to. It is therefore a **nutrient** and a **food**, and can be given in wasting diseases. In large doses (1 to 2 ozs.) it is a **mild laxative**, producing painless, soft stools, and is of great value in **inflamed and ulcerated piles, rectal ulcers, anal fissures**, and **constipation**, especially if produced by opium. It acts also as a **laxative** when given as an **enema** (4 ozs. to ½ pint of starch mucilage), in **fæcal impaction** and **intestinal obstruction**. Because the cholestrine of the gall stones is soluble in pure olive oil at the normal bodily temperature, it has been strongly recommended as a **solvent for gall-stones**, on the supposition that some of the constituents of the oil are excreted with the bile. 10 to 20 ozs. or even more of the oil have thus been given daily to those who suffer from **biliary calculi**, sometimes with good results. It is said that in 6 oz. doses, 12 hours after a blue pill, it has caused gall stones to pass out. It can be taken with food.

OLIVERI CORTEX. Oliver Bark.

(Ind. and Col. Addendum).

Syn. B. P.—Black Sassafras.

Habitat.—Australasian Colonies.

Source—The dried bark of *Cinnamomum Oliveri*.

Characters.—About 8 in. long, ⅓ in. wide; flat, covered with granular periderm of a deep orange brown color. The tissue beneath and the bark inside are amber brown. Odor aromatic, spicy. Taste agreeable, spicy, camphoraceous.

Action.—Aromatic.

OFFICIAL PREPARATION.

1. **Tinctura Oliveri Corticis.**—1 in 10 of Alcohol. (60 p. c.) **B. P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

It is used for the same purposes as cinnamon and sassafras.

OPIUM. Opium. N.O. *Papaveraceæ.*

Syn. I.V.—*Afim*, Beng. Hind.; *Ahifen*, Sans.

Habitat.—Asia-Minor, China, Persia and India (Behar and Malwa).

Source.—The juice obtained by incision from the unripe capsules of *Papaver somniferum* (white poppy), inspissated by spontaneous evaporation.

According to the B. P., any suitable variety of opium may be employed as a source of tincture and extract of opium of the respective alkaloidal strengths, provided that when dry, it contains not less than $7\frac{1}{2}$ p. c. of anhydrous morphine, but, when otherwise used for officially recognised purposes, opium must be of such a strength that when dried and powdered, it shall yield by the official method *not less than $9\frac{1}{2}$ to $10\frac{1}{2}$ p. c. of anhydrous morphine.* Opium containing more morphine may be diluted to that strength with any opium containing between $7\frac{1}{2}$ and 10 p. c. of morphine or sugar of milk.

Characters.—Rounded, irregular or flattened masses, from 8 ozs. to 2 lbs. When fresh, plastic ; and internally, moist, coarsely granular or nearly smooth, reddish or chestnut brown, but becoming harder on keeping and darkening to blackish-brown. Odor strong, characteristic. Taste bitter. *Impurities.*—Excess of water, stones, brick-dust, fruits, leaves, starch, &c.

Varieties.—(1) *Asia-Minor opium* known also as Smyrna, Turkey and Levant opium, having the above characters, but covered with poppy leaves, and fruits or seeds of *Rumex.* (2) *Constantinople opium* includes sometimes Turkey and Levant opium, in cakes or lenticular masses with a poppy leaf, but without *rumex* seeds. (3) *China opium, i.e.*, what is produced in China is rarely met with at Calcutta. (4) *Persian opium* in sticks or lumps. (5) Indian opium as manufactured by the Indian Government is of 3 kinds.—(*a*) *Provision opium* for China in balls covered with poppy leaves. (6) *Abkari or excise opium* for India in square cakes covered wtth Nepal paper. (*c*) *Medical opium* in cake and powder is made in Patna from (*a*) and (*b*), the highest in consistence and color being selected. Besides, there are Egyptian, German, French and English varieties.

Manufacture of opium.—It is prepared in India as follows :—As soon as the capsules of cultivated poppy plants are fully developed, they are scratched in the afternoon by a scarifier, which consists of 4 to 6 iron blades tied together slightly apart. A milky juice immediately exudes from these vertical parallel incisions, and is allowed to flow and thicken during the night. Early next morning, it is scraped off by an iron scoop and is collected into an earthen vessel. The incisions are repeated as long as any milky juice flows. The collected juice is evaporated and purified to the required consistence and then brought to the Government factory, where it is examined as to its purity, color, odor, consistence, &c. The poppy petals are made into cakes to form the inner and outer coverings of the balls.

Composition.—The chemistry of opium is complex. It consists of (1) *Primary alkaloids*, 18 in number—

Morphine about 12 p.c.
Codeine about 6 p.c.
Thebaine about 3 p.c.
Anarcotine or *Narcotine.*
Narceine.
Papaverine.
Pseudomorphine.
Cryptopine.
Protopine.
Hydroctarnine
Laudanine.
Landonosine
Meconidine.
Rhœadine.
Cadamine.
Gnoseopine.
Lanthoptine.
Xanthaline.

(2) *Secondary alkaloids* or *Derivatives*, 8 in number—

Apomorphine.	Apocodein.	Thebenine.	Cotearnine.
Oxydimorphine.	Desoxycodeine,	Thebaicine.	Rhœagenine.

(3) *Neutral Substances*, 3 in number.—

Opianine or Meconine, Meconoiosin, and Porphyroxin.

(4) *Organic Acids*, 3 in number.—Meconic acid, Thebolactic acid, Acetic acid.

(5) *Water.*—About 16 per cent.

(6) Resin, glucose, fats, caoutchouc, essential oil, odorous substances and salts of ammonium, calcium and magnesium.

Variation in composition.—The percentage of morphine varies in Patna opium 3 to 5, and in Smyrna opium 5 to 10½, whereas that of narcotine in the former 4 to 6, and in the latter 1 to 2.

Incompatibles.—Tannic acid and astringent vegetable preparations, salts of zinc, copper, iron, arsenic, lead and silver. Alkalis, their carbonates and ammonia.

Tests.—Add a weak solution of Fe_2Cl_6 to an aqueous solution of opium, when it at once assumes a blood red color, due to the presence of meconic acid. This color is not destroyed by HCl (distinction from *acetates*) or by Hg_2Cl_2 (distinction from *Sulphacyanides.*)

Morphine gives a beautiful greenish blue color with a dilute solution of Fe_2Cl_6.

Porphyroxin, first described by Merck, is found in Smyrna and Bengal opium and turns purple in the presence of HCl.

B.P. Dose.—½ to 2 grs.

Official Preparations.

1. **Emplastrum Opii**.—1 in 10. A hard brown solid. A local sedative.

2. **Extractum Opii**.—2 in 1. (Morphine 20 p.c.) Aqueous. Dark brown. **B.P. Dose**.—¼ to 1 gr. much stronger. General sedative, hypnotic, &c.

From Ext. Opii is made—

3. **Extractum Opii Liquidum**.—Morphine ¾ gr. in 110 ms. Dark brown. **B.P. Dose**.—5 to 30 ms. A weaker substitute for Liqr. Opii Sedativus (Battley).

4. **Pilula Plumbi cum Opio**.—1 in 8, or 12½ p.c. of opium. Astringent, narcotic. Ought to be freshly prepared made new. **B.P. Dose**.—2 to 4 grs.

5. **Pilula Saponis Composita**.—1 in 5, or 20 p.c. of opium. A light brown mass. **B.P. Dose**.—2 to 4 grs. More soluble than solid opium.

6. **Pulvis Cretæ Aromaticus cum Opio**.—1 in 40, or 2½ p.c. of opium. A pale brown powder. Suitable for children as an astringent and carminative. **B.P. Dose**.—10 to 40 grs. ½ to 1 gr. for a child 1 year old.

7. **Pulvis Ipecacuanhæ Compositus**. *Syn.—Dover's Powder.*—1 in 10, or 10 p.c. opium. A good diaphoretic. **B.P. Dose**.—5 to 10 grs.

From Dover's Powder is made—

8. **Pilula Ipecacuanhæ cum Scilla**.—1 in 20, or 5 p.c. of opium. A brown mass. Expectorant and narcotic. **B.P. Dose**.—4 to 8 grs.

9. **Pulvis Kino Compositus.**—1 in 20, or 5 p.c. of opium. A dark red powder. An astringent and narcotic. **B.P. Dose.**—5 to 20 grs.

10. **Pulvis Opii Compositus.**—1 in 10, or 10 p.c. of opium. A brown powder. Anodyne and narcotic. **B.P. Dose.**—2 to 10 grs.

11. **Suppositoria Plumbi Composita.**—1 gr. of opium in each.

12. **Tinctura Opii.** *Syn.—Laudanum.*—A dark reddish brown liquid. **B.P. Dose.**—5 to 15 ms. for repeated administrations. 20 to 30 ms. for a single dose. A general sedative, narcotic and hypnotic.

From Tr. Opii is made :—

13. **Linimentum Opii.**—1 in 2. A black liquid. A local anodyne.

14. **Tinctura Opii Ammoniata.** *Syn.—Scotch Paregoric.*—1 gr. opium in 96 ms. Expectorant and anodyne. **B.P. Dose.**—½ to 1 dr. diluted.

15. **Tinctura Camphoræ Composita.** *Syn.—Paregoric, Paregoric Elixir.*—Expectorant, Anodyne and stimulant. **B.P. Dose.**—½ to 1 dr. 4 ms. for a child 1 year old.

16. **Unguentum Gallæ cum Opio.**—1 in 13½, or 7½ p.c. of opium. A soothing anodyne pile ointment.

N.B. It is to be noted that the following preparations contain opium though their names do not indicate it :—Pill. Ipecac. c. Scilla, Pil. Saponis Co., Pulv. Ipecac. Co., Pulv. Kino Co., Sup. Plumb. Co. and Tr. Camph. Co.

NON-OFFICIAL PREPARATIONS.

1. **Enema Opii. B.P. '85.**—½ dr. tincture to 2 ozs.

2. **Lint. Opii Ammoniatum. B. P. C.**—Lint. Saponis 6, Lint. Camph. Co. 6, Tr. Opii 6, Lint. Belladon. 1, Liq. Ammon. Fort. 1, mix. and after standing one week filter quickly.

3. **Liqr. Morphinæ Bimeconatis** (*Squire*).—Morphine 1 p. c. A purified solution of the whole of the alkaloids of opium in a neutral state. *Dose.*—5 to 30 ms.

4. **Meconic Periodida.**—The above alkaloids combined with excess of iodine. *Dose.*—⅓ to ½ gr.

5. **Sydenham's Laudanum** or **Tr. Opii Crocata.**—It is Tr. Opii with saffron, cloves and cinnamon water, &c.

6. **Trochiscus Opii, B.P. '85.**—$\frac{1}{10}$ gr. of Extr. Opii in each. *Dose.*—1 to 6.

7. **Vinum Opii.**—Opium powder 1½, Sherry 20 ; macerate 7 days and filter : used as a collyrium (1 in 10 of water). 1 of opium in 13½. *Dose.*—10 to 14 ms.

MORPHINÆ ACETAS. Morphine Acetate.

$C_{17}H_{19}NO_3, C_2H_4O_2, 3H_2O.$

Source.—The carefully dried salt obtained by neutralising morphine with acetic acid.

Characters.—A white crystalline or amorphous powder. *Solubility.*—1 in 2½ (almost) of water, 1 in 100 of alcohol (90 p.c.), 1 in 5 of glycerin.

Incompatibles.—Salts of copper, iron, mercury, lead, zinc, alkaline carbonates, lime water, liqr. arsenicalis, and substances containing tannin.

Dispensing Hints.—A little acetic acid is to be added to make solution, as the salt loses a little acid on drying. Aqueous solutions deposit basic salts.

Action.—Anodyne, hypnotic, narcotic. **B.P. Dose.**—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

Official Preparation.

1. **Liquor Morphinæ Acetatis.**—1 gr. in 110 ms. Almost colorless. **B.P. Dose.**—10 to 60 ms.

Non-Official Preparations.

1. **Injectio Morph. et Atropinæ Hypodermica.**—Morphine Acetate $\frac{1}{2}$ gr. and Atropine Sulphate $\frac{1}{80}$ gr. in every 6 ms. *Dose.*—1 to 6 ms.
2. **Hypodermic Lamels.**—Each contains $\frac{1}{4}$ gr. of Morphine; and $\frac{1}{4}$ of Morphine with $\frac{1}{120}$ gr. of Atropine. These are safer.

MORPHINÆ HYDROCHLORIDUM.

Morphine Hydrochloride. $C_{17}H_{19}NO_3, HCl, 3H_2O$.

Syn. B.P. '85.—Hydrochlorate of Morphine.

Source.—Hydrochloride of an alkaloid obtained from opium.

Characters.—Acicular prisms of a silky lustre, or a white powder. *Solubility.*—1 in 24 of cold, 1 in 50 of alcohol (90 p.c.) 1 in 8 of glycerin.

Incompatibles.—Similar to Morphine Acetate.

Action.—The same as those of acetate. **B.P. Dose.**—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

Official Preparations.

1. **Liquor Morphinæ Hydrochloridi.** *Syn. B.P.—Solution of Hydrochlorate of Morphine.*—1 gr. in 110 ms. colorless. **B.P. Dose**—10 to 60 ms.
2. **Suppositoria Morphinæ.**—$\frac{1}{4}$ gr. in each.
3. **Tinctura Chloroformi et Morphinæ Composita.**—Chloroform $\frac{3}{4}$ m., Acid Hydrocyanic Dil $\frac{1}{2}$ m., and Morphine hydrochlor. $\frac{1}{11}$ gr. in 10 ms. **B.P. Dose.**—5 to 15 ms.
4. **Trochiscus Morphinæ.**—$\frac{1}{36}$ gr. in each. *Dose.*—1 to 6.
5. **Troch. Morph. et. Ipecacuanhæ.**—$\frac{1}{36}$ and $\frac{1}{12}$ gr. in each. *Dose.*—1 to 6.

Non-Official Preparations.

1. **Linctus Morphinæ, U.C.H.**—Liq. Morph. Hyd. 3 ms., Spt. Chloroform 3 ms., Glycerin or treacle 60 grs., water to 1 dr. *Dose.*—1 dr., 3 or 4 times or oftener daily. To be swallowed slowly.

MORPHINÆ TARTRAS. Morphine Tartrate (new).

$(C_{17}H_{19}NO_3)_2, C_4H_6O_6, 3H_2O$.

Source.—May be prepared by the combination of morphine and tartaric acid in molecular proportions.

Characters.—A white powder consisting of fine nodular tufts of minute acicular crystals. *Solubility.*—1 in 10 of water.

Action.—The same as those of the hydrochloride. **B.P. Dose.**—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

OFFICIAL PREPARATIONS.

1. **Injectio Morphinæ Hypodermica.**—3 grs. in 110 ms. *Dose.*—2 to 5 ms. hypodermically.

2. **Liquor Morphinæ Tartratis.**—1 gr. in 110 ms. colorless. Action as those of acetate and hydrochloride. **B.P. Dose.**—10 to 60 ms.

ADDITIONAL NON-OFFICIAL PREPARATIONS.

1. **Morphina.**—The chief alkaloid of opium. A white crystalline powder. *Solubility.*—1 in 1000 of cold water, 1 in 100 of alcohol, 1 in 10 of oleic acid. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ gr.

2. **Heroin** *Syn.—Di acetyl-Morphine Hydrochloride.*—A fine white powder soluble in water. A substitute for morphine. *Dose.*—$\frac{1}{120}$ to $\frac{1}{6}$ gr. in pill.

3. **Peronine.** *Syn.—Hydrochloride of Benzylic Ester of Morphine.*—A white powder soluble in water and alcohol. Hypnotic, analgesic, respiratory sedative in asthma, phthisis, rheumatism. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

4. **Dionine.** *Syn.—Hydrochloride Ethyl-Morphine* (Merck).—A white crystalline powder, soluble in water. A pleasant substitute for morphine without its undesirable effects. Recommended in morphine habit. *Dose.*—$\frac{1}{3}$ gr. 2 or 3 times daily. Subsequently $\frac{1}{4}$ to $\frac{1}{2}$ gr.

5. **Morphinæ Hydrobromidum.**—A white amorphous powder. Soluble 1 in 22 of water. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

6. **Morphinæ Lactas.**—A white crystalline salt, soluble in water 1 in 8. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

7. **Morphinæ Sulphas.**—Colorless acicular crystals. *Solubility.*—1 in 21 of water, freely in hot water. *Dose.*—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

PHARMACOLOGY OF OPIUM AND MORPHINE.

Opium and morphine resemble each other so closely in their actions that one description for the both will suffice.

Externally.—Opium to a certain extent depresses the sensory nerves, and is therefore a local **anæsthetic** and **anodyne**, but this fact is denied by many authorities. It is absorbed by the unbroken skin, but more freely by the denuded and exposed mucous surfaces.

Internally. **Gastro-intestinal tract.**—In moderate doses, opium causes dryness of the mouth, tongue and throat from the **diminished secretions**, due to its direct, local and remote action after absorption. In the same way, it acts on the **stomach** *reducing its sensibility, secretion, and peristalsis.* At the outset, it may sometimes cause nausea and vomiting from the irritation of the gastric nerves. As a result of all these actions, appetite fails, digestion is retarded, and pain, if any, is relieved. Afferent impressions or direct emetics can no longer induce vomiting. Entering the intestines, it performs the same functions, but its activity is more marked The secretion is considerably lessened and the peristalsis is so far reduced or arrested that **constipation** results. This paralysis of the muscular coat of the intestines is due to irritation of the inhibitory nerves of the walls of the bowels.

through the splanchnics. Hence, it is a **sedative, astringent** and **anodyne** to the bowels In very minute doses (½ to 1 m. of Tr. Opii), it has been observed to act as a **purgative**, probably either by lessening the action of the inhibitory nerves, or by diverting stimulus from them to the accelerator nerves of the bowels. Excessively large doses, about 1 dr. of laudanum, injected into the veins purge by tetanic contractions of the intestines. Subcutaneously injected, it is excreted into the stomach.

Blood and circulation.—Morphine enters the blood less rapidly than other alkaloids, and is found in the tissues as an oxidation product, oxydimorphine. What becomes of the other alkaloids is not known. In moderate doses, it **stimulates the heart** by its direct action on the nervo-muscular structure of the organ, and through the cardiac centre ; but with larger doses it is soon depressed, due to its direct local action and the stimulation of the vagus centre making the **pulse small** and **slow.** Before death, both these actions are so far depressed that the acceleration of the heart becomes an impossibility ; but the death in opium poisoning is *not due to the failure of the heart, but to the paralysis of the respiratory centre*, as will be seen presently. The vaso motor system is not affected till shortly before death, when the vessels dilate.

Respiration.—The respiratory centre is affected sooner than the cardiac, tending to make the respiration slow and feeble. Finally death takes place from **asphyxia**, while the heart still beats. Hence, it is a **direct paralyser** of the **respiratory centre.** It reduces the bronchial secretion and pulmonary circulation.

Liver.—Biliary secretion is considerably reduced, causing the stools to be pale or clay-colored, or jaundice may set in. The amount of sugar in diabetic urine, and that of urea and carbonic acid, according to some authorities, are diminished.

Temperature.—Large doses decidedly lower the temperature.

Nervous system.—The chief action of opium is on the nervous system. In small doses, it **first excites the higher faculties**, by directly influencing the cells of the convolutions, and not the cerebral circulaton as is supposed. During this stage, with a few, the excitement is a pure exaltation of feelings, the imagination being pleasantly excited with a sense of happiness and comfort. With others, the intellectual activity is heightened, and they can concentrate their energies better on a particular object. But, in the majority of cases, the excitability is not uniform. Extravagant and depraved ideas are often indulged in. **Depression** soon follows excitement, with **drowsiness** and **sleep**, of course according to the dose. After waking, there is a feeling of headache and nausea. In this stage, **higher centres** are first **depressed** and then the **lower ones.** Hearing, sight and cutaneous sensibility become blunted, and the sleeper feels no pain. If the dose is large, the excitement is only momentary or not at all, **coma** soon supervenes with a profound **depression** of the **cerebrum and reflex excitability**, the **pupils being contracted** Therefore, opium is a **stimulant, anodyne, hypnotic, narcotic** and **myotic**. Its effects on the **cardiac, respiratory**, and **vasomotor centres** have already been described. The **vomiting centre** may be stimulated in the beginning.

Nerves and muscles.—The **motor cells** in the **brain** and **spinal cord** are first stimulated and then depressed, first evidenced by restlessness, and then muscular weakness. The **motor** and **sensory nerves** are similarly affected. In the same way, it depresses the **afferent nerves of the viscera.** There is **no complete loss of muscular power or irritability**, for even in bad opium poisoning, a patient can be made to walk if supported. Brunton thinks that opium influences the terminal ends of the vaso motor nerves, and thus diminishes or prevents the reflex dilatation of the vessels caused by local irritation.

It can thus be seen that opium while acting on the brain illustrates the **two laws** already described in page 158.

Kidneys.—Opium **reduces** the quantity of urine secreted. Morphine is found unchanged in the urine. There is a chance of morphine being reabsorbed from the bladder, and a probability of its retention in the body, from defective elimination in renal disorders.

Skin.—Opium is a **diaphoretic**, acting by directly stimulating the sweat glands, and not by its local cutaneous action. It may cause itching and a rash. (page 148).

Secretions.—It diminishes every secretion of the body except that of the skin and the mammary glands.

Elimination.—It is excreted by most of the secretions of the body, chiefly bile, milk and urine.

Acute toxic action.—Poisoning by opium is very common in India, especially in Bengal, as there is no restriction to its sale. It is chiefly suicidal, and is more frequent amongst the natives than the Europeans. In most cases the natives mix it with oil before swallowing. Excitement in such a case is very brief or none at all. Drowsiness and stupor soon follow. The patient may be roused at first, but soon passes into a profound coma, and no external stimulus can rouse him then. The pupils contract to a pin's point ; surface becomes cold and clammy ; face and lips livid ; pulse very weak and slow ; respiration slow, irregular and at the end stertorous ; finally the patient dies from asphyxia. A few minutes before death, pupils dilate. P. M. appearances are like those of suffocation.

Diagnosis of opium poisoning.—This falls under the province of Medicine. However, a few hints will enable the reader to form a correct diagnosis. (1) **From alcoholic coma.**—Take a careful *history*. *Smell of breath* may not help always, as the opium and alcohol may be taken together, or one after the other or some one may pour down the throat. *Pupils* are contracted in opium poisoning, and normal or dilated in alcoholic poisoning. *External stimulus* rouses the patient more readily in alcoholic coma than in opium poisoning. *Stomach pump* will guide in some cases. (2) **From cerebral hæmorrhage**.—History. *Pupils* are unequally contracted, but if the hæmorrhage is on the pons varolii, they may be contracted and render the diagnosis more difficult. *Paralysis* of limbs occurs on one side. *Temperature* generally falls in the beginning and then rises. (3) **Uræmia**.—*Coma* less profound. *Albumen* in the urine. Sometimes convulsions alternating with coma. (4) **From diabetic coma** by the smell of breath and sugar in the urine. (5) **From epileptic coma** after a fit, by *coma* less profound, dilatation of pupils. (6) From *hysterical stupor*, by its characteristic symptoms and history. (7) From chloroform, ether and carbolic acid poisoning, by smell and other special symptoms.

Antidotes.—If opium or morphine swallowed,. emetics, stomach pump or apomorphine $\frac{1}{10}$ to $\frac{1}{5}$ gr. subcutaneously. Pot. Permaganas is a chemical antidote (1 gr. neutralises 1 gr. of morphine) and its solution (4 to 8 grs. in 4 to 8 ozs. of water) should be given at once, if the quantity of poison is unknown or large, before emetics or washing. A weak solution of Liqr. Pot. Permanganatis (1$\frac{1}{2}$ dr. to tepid water 1 pint) should be employed as a wash for the stomach. After washing 1 pint of strong tea or coffee can be injected into the stomach or per rectum. Atropine $\frac{1}{20}$ gr. hypodermically or Tr. Belladonna 30 ms. by the mouth is to be repeated $\frac{1}{4}$ or $\frac{1}{20}$ hour until pupils dilate or pulse quickens. Strychnine $\frac{1}{60}$ gr. hypodermically, repeated every 2 or 3 hours for heart and lungs. Similarly, artificial respiration, and inhalation of nitrite of amyl. Alternate cold and hot affusions, flagellations or taps upon the forehead with finger nails,sinapisms, electricity, sal volatile to the nose, and making the patient walk to and fro, should be adopted to keep the patient awake. Oxygen inhalation is also recommended. The treatment is to be kept up for several hours until the danger is over. Some authorities recommend washing the stomach now and then as opium is excreted in it, but that is unnecessary as the quantity is infinitesimal and the exhaustion is rather too much.

Chronic toxic action or **Morphinomania**.—Persons get soon habituated to the use, and can consume large quantities. It is therefore necessary that the patient should remain ignorant of the drug. India, Turkey, Persia and China are the principal countries where the drug is habitually indulged in. Morphinomania exists also in England. In India, opium is either eaten or smoked. Moderate doses (5 to 20 grs.) daily do no harm, but *Madak* and *Chandu* smokers are a disreputable set. Moral depravity, emaciation, anæmia, muscular weakness, physical depression, feeble pulse and small tremor, slight ataxy, loss of appetite, indigestion, sluggish bowels, insomnia, drowsy feeling, sexual impotence, amenorrhœa, small pupils, are the principal symptoms of morphinomania.

Treatment.—*Gradual* reduction is the best plan. Tea, coca bark, ammonia may be given to ward off depression and collapse. Sometimes small doses of alcohol may be necessary. If an opium eater be suddenly deprived of his accustomed dose of the drug, cerebral excitement, restlessness, pain in the stomach and a burning sensation in the back give great trouble. These symptoms are due to the formation in the tissues of an acrid irritating substance called "Oxydimorphine." Hence the necessity for gradual reduction of the opium so as to allow of the elimination of this product.

Modifying influences.—Many circumstances modify the action of opium. (1) *Age*.—Children are more susceptible to poisoning. An infant under 1 year should not have more than ½ to 1 m. of the tincture. (2) *Sex.*—Females suffer more from after effects than men. To a nursing mother it must be given with caution. (3) *Idiosyncracy.*—Some cannot take opium without brain symptoms, such as insomnia or delirium, while others suffer from gastric irritation. The writer had to treat a female in whom morphine ⅓ gr. hypodermically given, produced fainting, vomiting and collapse. (4) *Habit.*—Toleration is readily induced. Large doses become necessary to produce the desired effect, and gradually lead to *opium habit.* The writer knew a person who used to take 40 grs. of morphine daily. (5) *Disease.*—Acute painful diseases require larger doses. Subjects of Bright's disease can not bear much opium, and it should be given to them with great caution, also to persons suffering from cardiac, pulmonary and renal diseases, cerebral congestion and alcoholism. (7) *Drugs.*—Chloral hydrate, potassium bromide, chloroform, &c., increase its soporific virtue, while belladonna removes constipation, when given in combination.

Difference of actions between opium and morphine.—Though the description of the pharmacology of opium given in these pages, apply also to that morphine, yet there are certain differences which are detailed below :—

Opium.	Morphine.
1. Preparations less soluble, slowly absorbed. Action slow but more lasting	Preparations more soluble, readily absorbed, action quicker but not so lasting.
2. Its several constituents, such as thebaine, codeine, narcotine are convulsants.	Morphine not so in man.
3. Action variable on account of varying composition.	Action definite on account of definite composition.
4. Constipation, nausea and indigestion more frequent.	Constipation nausea and indigestion less frequent.
5. Better diaphoretic.	Feeble or no diaphoretic.
6. Less sedative and less soporific.	More sedative and more soporific.
7. Greatly reduces the sugar of diabetic urine.	Slightly reduces the sugar of diabetic urine.
8. Local action more marked on the intestines.	Less marked on the intestines.
9. Cannot be administered hypodermically.	Can be administered hypodermically.

Antagonists.—Atropine, caffein, chloroform, cocaine, physostigmine, strychnine are antagonistic to some action or other of morphine. But the antagonism between morphine and atropine is given below in detail :—

	Morphine.	Atropine.
Real	1. Cerebral convolutions depressed.	Cerebral convolutions stimulated.
	2. Respiratory centre depressed.	Respiratory centre stimulated.
	3. Intestinal peristalsis depressed.	Intestinal peristalsis stimulated.

Apparent	4. Pupils contracted through the pupillary centre in the aqueduct of Sylvius.	Pupils dilated through the paralysis of the ciliary branches of the 3rd. nerve.
	5. Diaphoretic through central nervous system.	Anhydrotic through the terminal nerves in the glands.

Though morphine and atropine are not true antagonists, yet they are **useful antidotes** to each other in poisoning and are also usefully combined to prevent certain unpleasant symptoms of the former.

Actions and uses of the principal constituents of opium.—(1) *Morphine* is already described. (2) *Codeine* and *Apomorphine* are separately noticed. (3) *Narcotine* or anarcotine is not hypnotic and said to be antiperiodic in ague. It is the principal constituent of Indian opium. (4) *Thebaine* produces convulsions like strychnine and is not used. (5) *Narceine* acts like morphine and is not used. (6) Papaverine opianine, cryptopnine act as morphine. (7) Laudanine, Porphyroxin like Codeine.

THERAPEUTICS.

Externally.—Opium is chiefly used as a local **sedative** and **anodyne**. Hot poultices or fomentations containing opium or with laudanum sprinkled, or the liniment, are often employed to allay the pain of **pleurisy, rheumatism, peritonitis, lumbago, inflamed joint,** &c The plaster or the paste of Ext. opii and glycerin aborts **boils** and **carbuncles** when applied early Opium decidedly soothes the pain of **sores** and **ulcers.** Morphine dissolved in glycerin relieves the pain of **cancers.** Vin. Opii, B. P. 1864, or Ext. Opii liq., dropped into the eyes, reduce pain of **conjunctivitis.** *Earache* is relieved by laudanum. Opium or morphine suppository and the gall and opium ointment often allay the pain of **anal fissures** and **piles.** Opium injection *per rectum* relieves **rectal tenesmus, urethal spasms,** or **pelvic pains** **Neuralgic pains** are better relieved when morphine is used hypodermically or endermically.

Internally.—Opium is a remedy *par excellence* for removing pain, subduing excitement and irritation, and inducing sleep.

Mouth and stomach.—Laudanum on a pledget of cotton wool put within a carious tooth relieves **toothache** Opium often controls **salivation** due to reflex irritation. Opium or morphine allays **gastric pain** and **vomiting** from 'whatever cause they arise Thus it is very useful in gastric **ulcer, cancer** and **gastritis** produced by alcoholism. Morphine with bismuth markedly relieves **gastrodynia** with or without heartburn. Reflex vomiting is readily checked by morphine, but not the pure gastric neuralgia, which is benefited by small doses of arsenic.

Intestines.—Of all the drugs we have for **diarrhœa** opium is most valuable. It is efficacious in acute, chronic or tubercular variety. In **lienteric diarrhœa** where the half digested food is simply swept down the canal by the excessive peristalsis, opium acts remarkably well. It is a capital plan to administer one or two doses of opium in diarrhœa or dysentery after the expulsion of the offending matters. It can be combined with other astringents in diarrhœa and with ipecacuanha in **dysentery**. In the early stage of **cholera**, especially when preliminary diarrhœa is the prominent symptom, opium may be usefully employed, but not in the cold stage. According to Ringer a small hypodermic injection of morphine ($\frac{1}{80}$ to $\frac{1}{50}$ gr.) promptly checks **choleraic** diarrhœa of children. In **typhoid fever** it serves a double purpose, by controlling wakefulness and delirium and subduing diarrhœa. A rectal injection may sometimes relieve where the ordinary method of administration by the mouth has failed, especially so in **dysentery**. It relieves **intestinal colic** caused by sharp aggravated contractions of the bowels. Large doses are needed to paralyse the bowels in **peritonitis, enteritis, perityphlitis, hernia, perforations**, and after **wounds** or **operations** in the abdomen. Serous inflammations are well treated when opium is given with a free hand. The patients should be kept just drowsy, and pupils slightly contracted until inflammatory symptoms subside.

Enema Opii is serviceable in various ways by checking flux, subduing local irritation, pain and spasm of the rectum and neighbouring structures, and setting at rest the pelvic organs. A **morphine suppository** generally averts a rigor likely to follow after **cathetarism** or **surgical abdominal operations**. To soothe local rectal pain, an ordinary dose is enough for rectal injection, but a large dose is required to induce sleep.

Heart and blood vessels.—Being a powerful depressant to the heart, opium must be given with caution in heart disease. But there can be no question that an unmistakable relief is afforded by morphine injection in the **dyspnœa of heart disease** and of **blood vessels**, and in **angina pectoris**. A single injection of $\frac{1}{6}$ gr. brings on refreshing sleep from which the patient wakes wonderfully revived ; but it cannot relieve **cardiac dyspnœa** caused by the pressure of **serous** and **dropsical fluid**. If the kidneys are diseased, opium is contra-indicated. Opium may also be usefully employed in soothing the pain of **aneurysm** and **intra-thoracic tumors**. Belladonna may be usefully combined to counteract the depressing influence.

On account of its soothing effect on the heart and blood vessels, it controls hæmorrhage, and is therefore an excellent **hæmostatic** in **intestinal** and **pulmonary bleeding** In the former, it is of special value, as it paralyses the peristaltic movements ; and in the latter, it not only slows the heart, and reduces blood-pressure, but lessens cough, produces sleep, and removes mental anxieties. Pil. Plumb. c. Opio, or a mixture containing morphine acetate, lead acetate and acetic acid, or opium with ergot and tannic acid may be usefully employed.

Respiratory tract.—Opium relieves *cough* and should not therefore be prescribed indiscriminately. When the coughing is harrassing and frequent, without much expectoration, and without any tendency to asphyxia or lividity, due to **reflex irritation** either from an intra-thoracic tumor, or from excessive irritability of the nerves, as in pleuritis, opium is justly and admirably indicated. But, when the act of coughing is only to empty the bronchial tubes of the abundant secretion, as in the **bronchitis** of the aged and infirm, or of the weak and young, opium is positively injurious: for it leads to inspissation and retention of the phlegm. In **phthisis** where the tuburcles press over the nerves, and give rise to a reflex cough, opium mav be given with benefit. In the same way, by the local application of morphine to the throat, in the form of linctus and lozenge, many reflex coughs can be relieved. Sometimes it gives marked relief to the whoop in **whooping cough**; $\frac{1}{4}$ to 2 ms. every hour, or $\frac{1}{50}$ gr. every 3 or 4 hours, according to the age of the child, should be continued until the whoop disappears. It should be given with great caution in **asthma**, lest it should create an opium habit, but the writer has seen instances, where the habitual use of opium cured asthma. The sharp stitch of **acute pleurisy** or **pleuro-pneumonia** is relieved, as if by a charm, with a hypodermic injection of **morphine** **Influenza** and **Coryza** are greatly benefited by Dover's powder.

Nervous system.—(1) As a **hypnotic** pure and simple, morphine is inferior to chloral hydrate (see p. 324), but for sleeplessness due to pain or irritation, it is a sovereign remedy. It is often used in the **insomnia** of acute diseases in the **delirium of remittent, typhoid** and **typhus fevers**, of **mania** and **alcoholism**, and in the **restlessness** of visceral diseases. But the gradual tendency nowadays is to supplement its use in many of these diseases, by chloral hydrate alone or with bromides, especially so in mania and delirium tremens. Morphine is sometimes used to prolong the anæsthesia of chloroform. (2) Its superior value as an **anodyne** has been long recognised. The list will be too long if we are only to enumerate the diseases where opium can be used as an anodyne. Besides the diseases already mentioned, it is given (hypodermic injection of morphine) with marked relief, in **biliary, renal, lead** and **intestinal colics, sciatica, facial** and other kinds of **neuralgias, severe pleurodynia**. The pains of **fractures, dislocations,** or **other injuries,** of **acute rheumatism, dysmenorrhœa,** and **malignant disease** are only a few instances, where opium or morphine can be most usefully employed. In short, any pain, inflammatory or otherwise, is relieved by opiates. It is to be noted that sufferers from pain can consume large quantities without poisoning. (3) As an **antispasmodic**, opium is sometimes used in epilepsy, hysteria or chorea for various reasons. The writer knows an instance, where a heavy opium-eater suffers from epilepsy, which repeats itself in spite of increasing the dose. Morphine suppository or opium enema decidedly relieves **spasmodic stricture**. Its utility in asthma and whooping cough have already been noticed.

Cord.—The pains and spasms of certain diseases of the cord, such as **locomotor ataxy** are subdued by the subcutaneous injection of morphine. Morphine is sometimes given to arrest the convulsions of **tetanus** and **strychnine poisoning**. A medical man by mistake took 40 ms. of Liq. Strychninæ, and 80 ms. of Liqr. Morphinæ put a stop to the threatening convulsions, he being a daily eater of morphine ½ gr.

Kidneys.—As morphine is not rapidly eliminated by the diseased kidneys, it should be given with the greatest caution in **Bright's disease**, for there are instances to shew, that small doses produced fatal results. But, a hypodermic injection of ⅙ gr. of morphine has occasionally been found to remove **uræmic insomnia**, **uræmic convulsions**, and **uræmic** or **cardiac dyspnœa** most surprisingly. As it reduces sugar in diabetic urine, opium, codeine and morphine are employed in **diabetes mellitus**.

Skin.—As a diaphoretic, Dover's powder is used in a variety of diseases, such as cold, influenza, and slight inflammatory conditions. It checks the **night-sweats of phthisis**.

Uterus.—Opium is invaluable in arresting a threatening abortion. It must be given in large doses, laudanum in 20 ms. or 30 ms. or the extract in .1 gr. doses every 3, 4 or 6 hours as indicated. Sometimes a suppository or enema succeeds better When opium fails, morphine with digitalis may succeed. It is also used to relieve afterpains.

Malaria.—It is a fact that opium eaters are less liable to malarial poisoning, and they enjoy better health in malarial districts. Opium occasionally cures **malarious fever** where quinine fails, or the two drugs combined are more successful than either given alone. The writer has seen a few cases of **elephantoid fever** checked by the habitual use of opium.

Mode of adminstration.—Opium and morphine can be administered by (1) the **mouth**, as pill, powder and mixture ; (2) **per rectum**, as suppository or enema ; (3) by the **respiratory tract**, as smoking, such as *madak* or *chandu* ; (4) **enepidermically**, as plaster or paste ; (5) **epidermically**, as liniment ; (6) **endermically**, as dusting of morphine on a denuded surface ; (7) **hypodermically**, as hypodermic tablet or solution, when the pain is very severe, such as colic or neuralgia. This has a threefold advantage, (*a*) the *required effect* is gained by a smaller dose ; (*b*) *constipation* is less liable to take place, and also appetite is not lost, (*c*) affords *quickest relief* ; and (8) an **insufflation** (morphine acetate ½ gr. with starch 5 grs. A grain of boric acid or iodoform may be added) in painful organic disease of the larynx.

Rules regarding the administration of hypodermic injection of morphine :—

The physician is only justified in doing this under three conditions (1) When, in the treatment of an acute disorder, one or a few injections only will be required—(recent wounds, acute illness or acute neuralgias). (2) When the morphia habit, if developed, would be a lesser evil than to allow the patient to suffer the pain and excitement that can be subdued by the drug (cancer, tubercle). (3) When the death agony is accompanied by severe pain.

APOMORPHINÆ HYDROCHLORIDUM.

Apomorphine Hydrochloride.

$C_{17}H_{17}NO_2$, HCl.

Syn. B.P. 1885.—Hydrochlorate of apomorphine.

Source.—This is the hydrochloride of an alkaloid obtained by heating morphine hydrochloride or codeine hydrochloride in sealed tubes with hydrochloric acid. Morphine losing one molecule of water, thus, - $C_{17}H_{19}NO_3 = C_{17}H_{17}NO_2 + H_2O$.

Characters.—Small, greyish-white, shining needles, turning green on exposure to light or air ; faintly acid. *Solubility.*—1 in 50 of water, 1 in 50 of alcohol (90 p. c.)

Action.—Emetic and expectorant. **B.P. Dose.**—$\frac{1}{20}$ to $\frac{1}{10}$ gr. hypodermically as an emetic ; $\frac{1}{10}$ to $\frac{1}{4}$ gr. by the mouth as an expectorant. Maximum single dose $\frac{1}{7}$ gr. ; maximum daily dose $\frac{3}{4}$ gr.

Dispensing hints.—Should be dispensed in colored bottles when given as a mixture.

OFFICIAL PREPARATION.

Injectio Apomorphinæ Hypodermica.—1 gr. in 110 ms. Should be prepared fresh. **B.P. Dose.**—5 to 10 ms. (= $\frac{1}{22}$ to $\frac{1}{11}$ gr.)

NON-OFFICIAL PREPARATION.

1. **Hypodermic Discs.**—Contain $\frac{1}{10}$ gr. in each. Very convenient for use.

2. **Syrupus Apomorphinæ Hydrochloridi. B. P. C.**—Apomorph. Hyd. 5 grs., Acid Hydrochlor. dil 15 ms., Alcohol (90 p. c.) 7 drs., Aqua Distilled 7 drs., Syrup. to 20 ozs. Dissolve the salt in the spirit and water mixed, then add acid and syrup.

PHARMACOLOGY.

Externally—A 1 per cent solution dropped into the eye causes **anæsthesia** ; but it may cause local pain and may induce vomiting from absorption.

Internally.—**Stomach.**—Apomorphine is a reliable emetic acting directly on the vomiting centre, and not locally on the stomach. It is therefore an **indirect emetic** (see p. 127). Its action is prompt, powerful and complete, and is not preceded by nausea and followed by any appreciable depression. It does not irritate the stomach and produces emesis when other emetics given by the mouth fail. $\frac{1}{3}$ gr. given *per rectum* also induces vomiting.

Heart and circulation.—In medicinal doses it has no action on the heart and blood vessels, beyond a slight depression from the effect of vomiting, but in large doses, it increases the **frequency** of the **pulse**, probably by stimulating the accelerator nerves. In toxic doses, the pulse beats fall from the paralysis of the cardiac muscles.

Respiratory tract.—Rossbach's experiments have proved that apomorphine produces a **copious secretion** from the mucous membrane, without being preceded or accompanied by its **hyperæmia**. This hypersecretion is due to its direct influence on the terminal ends of the gland-nerves, gland cells or the minute ganglia, to which it is carried by the blood current. Thus, it renders a thick viscid mucus more liquid. It is therefore a valuable **expectorant**. Large doses depress the respiratory centre.

Nervous system.—Large doses cause **paralysis of the motor nerves**, and therefore of the muscles. In moderate doses it first excites the cerebrum causing delirium and finally paralyses it.

THERAPEUTICS.

Internally.—As a prompt and certain **emetic**, apomorphine is invaluable in **poisoning**, *i. e.* in narcotic poisoning, drunkenness, &c. Its effects are most marked in cases, where the power of deglutition is lost, and where the emesis cannot be induced by ordinary drugs on account of the depressed condition of the nervous centres by narcotic poisons. For this purpose, $\frac{1}{10}$ gr. hypodermically acts often in 1 to 2 minutes; although given by the mouth, apomorphine may produce vomiting after absorption, but larger doses are necessary. A plum stone obstructing the œsophagus was removed by vomiting induced by apomorphine. As an **expectorant**, it is always given by the mouth In the early stages of the **inflammation of the larynx, trachea** and **bronchi**, when the mucous membrane is dry or secretes a viscid tenacious mucus, apomorphine loosens secretion and removes inflammation. In croup and acute bronchitis of children it is useful. In **subacute** or **chronic bronchitis, broncho-pneumonia, chronic catarrh of larger tubes**, or **bronchial irritation** caused by the inhalation of jute, flax, cotton or other foreign particles, it is most useful if the secretion is scanty and tenacious. A few cases of dry **bronchial asthma** have been wonderfully relieved by $\frac{1}{20}$ to $\frac{1}{40}$ gr. of apomorphine. It may be given alone or mixed with other expectorants. In whooping cough it has been found serviceable combined with morphine. Sometimes it can be usefully combined with morphine in the form of a linctus with syrup of virginian prune, syrup of tar, or syrup of lemon. Murrell has given 1 gr. for 3 or 4 times a day without bad results. Binz says to use $\frac{1}{60}$ to $\frac{1}{30}$ gr.

Caution.—It should be given with great caution to the feeble, the aged, and children and to those subject to chronic diseases of the heart and lungs.

CODEINA. Codeine.

$C_{17}H_{18}(CH_3)NO_3, H_2O.$

Source.—An alkaloid obtained from opium or morphine.

Characters.—Nearly colorless trimetric crystals. *Solubility.*—1 in 80 of water, 1 in 24 of boiling water, 1 in 2 of alcohol (90 p. c.), 1 in 2 of chloroform.

Action.—Hypnotic, reduces sugar in diabetes. **B.P. Dose.**—$\frac{1}{4}$ to 2 grs. Hypodermic injection.—$\frac{1}{8}$ to 1 gr. Maximum daily dose.—20 grs. cautiously increased.

NON-OFFICIAL PREPARTIONS.

1. **Codeine Pastils.**—$\frac{1}{8}$ gr. in each. Take 1 when the cough is troublesome.
2. **Codeine Iodate.**—Analgesic. *Dose.*—$\frac{1}{2}$ gr. hypodermically.
3. **Syrupus Codeinæ. B. P. C.**—Codeine 8 grs., Proof spirit $\frac{1}{2}$ oz., Water $\frac{1}{2}$ oz. ; dissolve and add syrup to 8 ozs. *Dose.*—1 to 2 tea-spoonfuls.
4. **Pilula Codeinæ Comp.**—Codeine $\frac{1}{4}$ gr., (increased to 2 grs.) Extr. Nucis Vom. $\frac{1}{2}$ gr., Ext. Lettuce $\frac{1}{4}$ gr. Mix for one pill. Two for three for diabetes.
5. **Apocodeinæ Hydrochloridum.**—A yellowish-grey, hygroscopic powder, soluble in water. Expectorant, sedative, hypnotic, increases salivation and peristalsis. *Doses.*—$\frac{1}{4}$ to 1 gr. Hypodermic Inj.—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

CODEINÆ PHOSPHAS. Codeine Phosphate.

$(C_7H_{18}(CH_3)NO_3, H_3PO_4)_2, 3H_2O.$

Source.—The phosphate of an alkaloid obtained from opium or morphine.

Characters.—White crystals, taste slightly bitter. *Solubility.*—1 in 4 of water, 1 in 200 of alcohol 90 p. c.

Action.—The same as of codeina. **B.P. Dose.**—$\frac{1}{4}$ to 2 grs. Hypodermic injection.—$\frac{1}{4}$ to 1 gr.

OFFICIAL PREPARATION.

1. **Syrupus Codeinæ.**—1 in 240. $\frac{1}{4}$ gr. in 1 dr. A colorless syrup. **B.P. Dose.**—$\frac{1}{2}$ to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Codeine is a **feeble narcotic**, because it does not depress the cerebral convolutions so actively as morphine, but it excites the cord more. It does not produce nausea, vomiting or constipation, but the writer has observed that it often causes costiveness and deficient biliary secretion. It is a great **paralyser of the visceral nerves,** for it has been found that after administration, irritant poisons, such as arsenic, produced neither vomiting nor purging. It decidedly excites both cerebral and spinal motor centres, consequently muscular tremor may follow in spite of its feeble sedative effect. Cautiously increased, it markedly **lessens the amount of sugar** in diabetes, but not so well as opium.

Internally.—On account of its sedative influence on the visceral nerves, it soothes the **hacking cough of phthisis,** and **visceral neuralgia,** especially in connection with the abdomen. Syrup. Codeinæ is the best to use for allaying cough. Sometimes it is used with advantage in **insomnia** due to pain in some peripheral regions, or to nausea, when it should be given in 1 or 2 gr. doses, every 4 or 6 hours, till sleep comes on. But its chief use is for **diabetes mellitus,** in which case it can be given in the form of a pill. The phosphate being more soluble than the alkaloid, can be used in a mixture.

PANCREATIS LIQUOR.

Pancreatic Solution.

Source.—A liquid containing the digestive principles of fresh pig's pancreas, obtained by digesting 5 ozs. of pancreas freed from fat, and triturated with washed sand or pumice stone, in 20 ozs. of alcohol (20 p. c.) for 7 days. *Dose.*—1 to 2 drs.

NON-OFFICIAL PREPARATIOTS OF PANCREAS.

1. **Ext. Pancreatis.**—An American preparation sold in powder, tablets and peptonising powders.
2. **Pancreatin, U. S.**—Yellow or greyish-white amorphous powder, soluble in water. *Dose*—2 to 4 grs. **Tablets.**—2½ grs. with sodium bicarbonate in each.
3. **Pilula Pancreatica.** (Benger's).—Keratined. One after meal in pancreatic diabetes.
4. **Pancreatic Emulsion** or **Pancreatised Fat.**—A milky or creamy preparation obtained by mixing and pounding pig's pancreas with lard dissolving in ether and emulsified by spirit and water. *Dose.*—1 to 3 drs. with milk or water.
5. **Peptonised Milk.**—Dilute 1 pint of milk with 4 ozs. of water, and heat to 140° F. (if a thermometer is not at hand, boil one-half of the mixture and add it to the other half). To this, add two tea-spoonfuls of liquor pancreatis or 5 grs. of extract pancreatis with 20 grs. of sodium bicarbonate and leave the vessel near a fire or hearth for 15 minutes, or in the ordinary temperature of the room for 3 hours. If not used at once, it must be heated to a boiling point. Fairchild's powder containing both the extract and soda is more convenient. Similarly other liquid foods can be treated. The bitter taste of the milk is covered by soda water, or sweetened and warmed for infants.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Normal human pancreatic juice is believed to contain 4 digestive ferments,—(1) *trypsin*, which converts proteids into peptones in alkaline or neutral media ; (2) a *curdling ferment*, which curdles casein and peptonises milk ; (3) *pancreatic diastase*, which changes starch into sugar and dextrin ; (4) *emulsive enzyme*, which saponifies and emulsifies fat. Both the official and Benger's pancreatic solution contain the first three ferments, and are best suited for pre-digesting liquid food before being eaten. Milk, soup, gruel, &c., can thus be artificially digested before administration in **dyspepsia, diarrhœa, gastric dilatation, ulcer** and **cancer** ; and other conditions of the system in which the pancreatic secretion is deficient. Children deprived of natural nourishment fare well on pancreatised food. Benger's food containing partially dextrinised wheaten flour by dry cooking and impregnated with pancreatic extract, is an excellent diet for such children. Trypsin and desiccated pancreas, in pills coated with keratin, or the Pil. Pancreatica, can be given two hours after meals with 20 grs. of sodium bicarbonate. Keratin protects them from the acidity of the stomach Pancreatic solution is used in **diabetes** originating from pancreatic functional disturbance. Liquor pancreatis is mixed with the **nutrient enemata** just before injection, or injected into the bladder to disintegrate the blood clots. Pancreatic emulsion is often given with cod-liver oil in wasting diseases, when the stomach cannot well digest fat.

PAPAVERIS CAPSULÆ. Poppy Capsules.

N. O. *Papaveraceæ.*

Syn. I. V.—*Postodhenri*, Beng.

Source.—The nearly ripe dried fruits of *Papaver somniferum*. The opium yielding poppy is widely cultivated in India. There are 3 centres of cultivation, *viz.*,—(1) Behar, with Patna as its head quarters, (2) Benares and North Western Provinces with Gazipur as their central depot, and (3) Central and Western India and Rajputana.

Characters.—Globular or ovoid, with a thin, dry, brittle pericarp 2 to 3 in. in diameter ; crowned by stellately arranged stigmas ; yellowish-brown, with dark spots. Presents internally thin parietal placentas and numerous, small, reniform, reticulated whitish seeds (*Posto*, Beng. Hind.) Pericarp bitter.

Composition.—(1) *Opium*, a small percentage. The seeds contain a bland oil (*postor tel*, Beng.) which can be used as a substitute for olive oil.

Action.—Said to be a feeble anodyne and narcotic.

NON-OFFICIAL PREPARATIONS.

1. **Decoctum Papavaris. B.P. '85.**—2 ozs. to 1 pint. For fomentation to painful parts.

2. **Extractum Papaveris. B.P. '85.**—A brownish black extract. Hypnotic without much after-effects. *Dose.*—2 to 5 grs.

3. **Syr. Papaveris.**—1 in 2¼ nearly. A dark brown syrup. Anodyne and narcotic. *Dose.*—1 dr. Not to be given to young children.

PHARMACOLOGY AND THERAPEUTICS.

Poppy heads are used even now in the form of a fomentation to allay pains. The syrup is also occasionally used as a narcotic and hypnotic.

PARAFFINUM DURUM. Hard Paraffin.

Syn.—Paraffin Wax.

Source.—Obtained by distillation from shale and separation of the liquid oils by refrigeration and purification of the solid product.

Characters.—Colorless, semitransparent, crystalline, inodorous, tasteless, solid, greasy to the touch. Sp. gr. 0·82 to 0·94. *Solubility.*—Not in water, entirely in ether and slightly in alcohol.

NON-OFFICIAL PREPARATION.

1. **Cerosin.**—A hard white-paraffin prepared from ozokerit, or earth wax. When artificially colored it is like **yellow wax.**

Uses.

In pharmacy it is used as **a basis** for ointments, or as an **excipient** for silver nitrate and permangate of potash pills.

PARAFFINUM LIQUIDUM. Liquid Paraffin.

Syn. Commercial.—Adepsine Oil, Glymol, Oleum Deelinæ, Paroleine and Chrismaline.

Source.—Obtained from petroleum after the more volatile portions have been removed by distillation

Characters.—A colorless, tasteless, odorless, oily liquid. Sp. gr. 0·885 to 0·890. Boils not below 680°F.

NON-OFFICIAL PREPARATIONS.

1. **Emulsio Petrolei cum Hypophosphitibus B.P.C.**—Liquid Paraffin 8 ozs., Acacia Gum 4 ozs., Oil of Cinnamon 24 ms., Tragacanth 2 drs., mix and add 6 ozs. of water. Triturate with calcium and sodium hypophosphites, each 192 grs., dissolved in 4 ozs. of water. Finally add water *q. s.* to 24 ozs.

2. **Vasogen** and **Valsol.**—This is oxygenated petroleum. A vehicle for skin medications. Dissolves camphor, chloroform, creosote, iodine, guaiacol, ichthyol, iodoform, menthol, &c.

PARAFFINUM MOLLE. Soft Paraffin.

Syn Commercial.—Vaseline, Petroleum Jelly, Adepsine, Chrisma, Cosmoline, Fossiline, Ozokerine, Geoline and Salvo Petrolia.

Source.—Obtained by purifying the less volatile portions of petroleum and containing soft members of the paraffin series of hydrocarbons.

Characters.—White or yellow, translucent, soft, unctuous, odorless, free from acidity or alkalinity. Melts at 96° to 102° F. *Solubility.*—Similar to hard paraffin. *Impurities.*—Fixed oils, fats and resins.

Enters into.—6 ointments and the

OFFICIAL PREPARATION.

1. **Unguentum Paraffini.**—It should be prepared with the white variety. The yellow variety is to be used as a basis for colored ointments.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Paraffins neither irritate the skin, nor become rancid, nor are they acted upon by acids, alkalis or oxidising agents. They are therefore superior to lard, and form a valuable **basis for ointments**, meant for **local action** only. As they are very **feebly absorbed**, they cannot be used as a basis where constitutional action of drugs is intended. Liquid paraffin is a useful **solvent** for many drugs intended for hypodermic injection. Hard paraffin is used to give consistence to softer ointments, especially in India during the hot weather. As they are non-irritant and do not undergo a change by exposure to the air, they are very useful lubricating and protecting agents in **psoriasis, xeroderma, chapped hands** and **nipples, eczema, sunburn**, &c. Oleum Deelinæ has given excellent results in the writer's hands in acute and chronic eczema. Petroleum is locally used with good effect in chronic rheumatism.

Internally.—Cocaine, menthol, morphine, &c , are dissolved in liquid paraffin for application as a **spray** to the throat and laryngeal affections. Some of the liquid varieties are given with the hypophosphites in the form of an emulsion, but beyond their forming a bland basis, very little is known of their effects in the tissues. Prof. Shoemaker says that taken in small quantities petroleum acts as a diaphoretic, expectorant and antispasmodic. It is also said to disinfect the gastro-intestinal and respiratory tracts.

PARALDEHYDUM. Paraldehyde. $C_6H_{12}O_3$.

Source.—A product of polymerisation of aldehyde by various acids and salts.

Characters.—A clear colorless liquid ; odor ethereal ; taste acrid, afterwards cool ; congeals below 50°F ; boils at 255·2°F. *Solubility.*—1 in 8½ of water, and with all proportions in ether and alcohol.

Action.—Hypnotic. **B.P. Dose.**—½ to 2 drs.

PHARMACOLOGY.

Externally.—Antiseptic.

Internally.—Paraldehyde is readily absorbed, and manifests its action chiefly on the cerebrum, producing calm refreshing sleep, akin to natural slumber, without after-effects and cardiac depression. It is therefore a pure **hypnotic**, like chloral hydrate, but its action is more speedy. In moderate doses, it **increases the flow of urine**, without deranging the digestive tract, or affecting the cardiac or respiratory centres, which are paralysed only by enormous doses, death taking place from respiratory failure. It is partly eliminated by the breath to which it imparts an unpleasant ethereal odor. A roseolous rash is sometimes noticed on the skin.

Paraldehyde is contained in, and is probably the principal therapeutic agent in, spiritus ætheris nitrosi. The disagreeable odor sometimes noticed in the breath of patients taking Sp. ætheris nitrosi is due to paraldehyde.

THERAPEUTICS.

Internally.—Paraldehyde may be safely used as a hypnotic in **insomnia** of **cardiac** or **respiratory diseases**, **mania**, **hysterical excitement**, **melancholia** and in the *later stages* of **adynamic fevers**, &c. It has been tried in asylum practice and is considered by many to be a valuable remedy. Constant use may produce toleration of the drug.

It is a very useful hypnotic for the purpose of weaning patients from the **morphia habit**, as the unpleasant smell given to the breath prevents them from indulgence in it surreptitiously. It acts satisfactorily as an enema.

Several cases of rapid relief of **asthma** are recorded.

Prescribing hints.—Its pungent disagreeable taste may be disguised by mixing it with syrup and tincture of orange, or giving it in almond mixture, in syrup and peppermint water, or in capsules. Large doses should be emulsified with compound tragacanth powder. Remember that you order sufficient water to dissolve all the paraldehyde.

PAREIRÆ RADIX. Pareira Root.

N.O. *Menispermaceæ.*

Habitat.—Brazil.

Source.—The dried root of *Chondrodendron tomentosum.*

Characters.—In long, cylindrical, twisted pieces ; ¾ to 2 in. in diameter ; bark thin, blackish-brown with longitudinal furrows and transverse ridges and fissures. Internally yellowish or brownish-grey, with circles of porous wood and large medullary rays. Waxy when cut. Taste bitter. Odorless. *Impurities.*—Spurious Pareira and stems resembling the root.

Composition.—(1) *Pelosine* or *Buxine*, identical with berberine. (2) *Starch* and *Resin.*

Identification.—It should not be mistaken for false Pareira brava root. In the root of *Chondrodendron* there is a large well-marked central column composed of wedges diverging from a common axis, round which are arranged a few concentric rings intersected by wedge shaped rays, which are often irregular, scattered and indistinct. The axis not often centric. In *Cissampelos Pareira* the root and stem are nearly alike in structure, and in transverse section there are concentric rings.

Incompatibles.—Ferric salts, lead salts and tincture of iodine.

Action.—Diuretic, tonic and sedative to the mucous membrane of the bladder.

OFFICIAL PREPARATION.

1. **Extractum Pareiræ Liquidum**.—Extractives 25 p.c. A black liquid. **B.P. Dose**.—½ to 2 drs.

PHARMACOLOGY.

Internally.—The actions of pareira are not well understood. It is considered to be a **mild bitter tonic**, improving appetite and giving tone to the bowels. It is said to be a gentle **laxative**. The active principle is eliminated by the kidneys which it stimulates, and thus acts as a **diuretic**. During its passage, pelosine soothes and tones the mucous membrane of the genito-urinary tract. It is therefore very useful in **cystitis, hæmorrhage** from the **bladder, suppurative renal diseases**, and sometimes in **gonorrhœa** and **gleet**. Hence its actions and uses closely resemble those of buchu. Strange to say, it cannot check bleeding from other organs. In order to get the full effects, the liquid extract must be given in big doses (2 drs.) with liq. potassæ and hyoscyamus.

PEPSINUM. Pepsin.

Source.—An enzyme obtained from the mucous lining of the fresh and healthy stomach of the pig, sheep or calf.

Characters.—A yellowish-brown or white powder, or pale-yellow translucent grains or scales. Odor faint, taste slightly saline. Should be free from any putrescence. *Solubility.*—Moderately in water, and 1 in 100 of alcohol (90 p. c.).

Test.—Should dissolve 2500 times its weight of hard boiled white of egg, with water acidulated with hydrochloric acid.

Incompatibles.—Alcohol, tannin, alkaline carbonates.

Action.—A digestive adjuvant. **B.P. Dose**.—5 to 10 grs.

OFFICIAL PREPARATION.

1. **Glycerinum Pepsini**.—5 grs. in 1 dr. A solvent for diphtheritic membrane. **B.P. Dose**.—1 to 2 drs.

NON-OFFICIAL PREPARATIONS.

1. **Liquor Pepticus** (Benger's).—A solution of gastric ferments in weak alcohol. *Dose.*—1 to 2 drs.
2. **Pepsina Amylacea**. *Syn.—Pepsine Acide Amylacee ou Poudre Nutritive.* (French).—*Dose.*—5 to 15 grs.
3. **Pepsinum Saccharatum U. S.**—Pepsin U. S. 1, Sugar 9. *Dose.*—1 to 1½ gr.
4. **Pepsin Tablets**.—3 grs. in each. *Dose.*—1 or 2 with meals.

5. **Vinum Pepsinæ. B. P. C.**—Pepsin 320 grs., Hydrochloric acid 2 drs., Glycerin 1 oz., Sherry *q. s.* to 1 pint. *Dose.*—1 to 2 drs.

6. **Peptone.** (Merck).—A light brown powder soluble in water. A nutrient for invalids, given in enema. *Dose.*—½ to 1 oz.

Note.—Chapoteaut of Paris prepares pepsine perles made from the stomach of the sheep. These can safely be given to Mahomedan patients who object to taking pepsin porci.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Medicinal pepsin can convert outside the body, in the presence of warmth, moisture and acidity, **proteids** (albumen, fibrin, &c.) into **peptones**, and this action is taken advantage of in predigesting food for administration by the mouth or rectum ; but the taste of the peptonised product becomes so unpalatable, that it cannot be ordinarily prescribed. As the rectum has very feeble digestive powers, **peptone** and peptonised food form a valuable **nutrient enema**, in a case of rectal feeding. By the following method meat can be peptonised :—Take clean lean meat 1 ℔., reduce it to a fine pulp, add water 6 ℔s. acidulated with hydrochloric acid ·2 p. c., and containing pepsin 2 drs. Digest in a porcelain digester for 5 or 6 hours at 120°F. with sodium bicarbonate, boil and filter. Lastly evaporate the filtrate on a water bath to the consietence of a soft extract. 30 grs. of this extract with 40 grs. of cacao butter makes a **peptonised meat suppository**, which may be introduced with advantage into the rectum. Glycerinum pepsini has been applied to the **diphtheritic false membrane** to cause its solution.

Internally.—A similar process within the stomach, as seen outside, takes place when pepsin is given by the mouth. Though it attacks the albuminoid principles of food like *trypsin*, yet the actions of these two ferments are not identical. Pepsin digests egg albumen more readily than milk, whereas the pancreatic extracts more readily the latter. Pepsin is therefore a **valuable agent in helping the digestion** of those, in whom the secretion of the **gastric juice is deficient** from.—

(1). Disease of the gastric follicles, as atrophy or dilatation.

(2). Excessive secretion of mucus, as chronic gastric catarrh, alcoholism.

(3). Deficient circulation, as in anæmia, general debility, old age.

(4). The irritable conditions of the stomach due to ulcer, cancer, &c In cases of gastric ulcer, it is to be given with caution as pepsin might reach the liver unaltered. Pepsin is recommended in **diarrhœa** of children, and some forms of **vomiting** caused by imperfect digestion. It is useless for the digestion of the carbo-hydrates and fatty food.

Prescribing hints.—Pepsin may be given in powders, pills, cachets, tablets or capsules. Many of the market preparations are worthless, and are therefore to be tested. Being reliable preparations Glycerinum pepsini and Benger's Liquor Pepticus are the best to use. It should be given with, or directly after, meals, either combined with, or followed by, a dose of Acid. Hydrochlor. dil. See also page 89

PHENACETINUM. Phenacetin.

$C_2H_5O{\cdot}C_6H_4{\cdot}NHCOCH_3$.

Syn. B.P.—Para-acet-phenetidin.

Source.—Produced by the interaction of glacial acetic acid and para-phenetidin, a body obtained from para-nitro-phenol.

Characters.—White, tasteless, inodorous, glistening, scaly crystals, neutral; melts at 275° F. *Solubility.*—1 in 1700 of cold water, 1 in 50 of boiling water, 1 in 21 of alcohol (90 p.c.), and glycerin. *Impurities.*—Acetanilide, para-phenetidin.

Action.—Analgesic, antipyretic. **B.P. Dose.**—5 to 10 grs. As an antineuralgic 15 to 20 grs. Up to 5 grs. to children. In cachets or suspended in water with mucilage.

NON-OFFICIAL PREPARATIONS.

1. **Amygdophenin.**—A derivative of amygdalic acid and para-amidophenol. A greyish-white crystalline powder, sparingly soluble in water. Anti-rheumatic and analgesic. *Dose.*—8 to 15 grs.

2. **Kryofin.**—A condensation product of para-phenetidin and methyl-glycolic acid. Analgesic and antipyretic, sometimes causing severe sweating. *Dose.*—8 to 15 grs.

3. **Apolysin.** *Syn.—Mono-phenetidin Citrate.*—A yellowish-white crystalline powder soluble in water, acting like phenacetin. It is harmless even when given in 2 drs. daily. But its analgesic property is inferior to that of phenacetin. Powerfully antiseptic. *Dose.*—10 to 30 grs. or 8 grs. in suppository with cocoa-butter.

4. **Citrophen.**—A dibasic para-phenetidin citrate. Acts like phenacetin, but the sweating is excessive. *Dose.*—3 to 8 grs.

5. **Lactophenin.**—A derivative of lactic acid and phenetidin. A white, bitter, crystalline powder. Analgesic, antipyretic, hypnotic. Found useful in typhoid fever, erysipelas, migraine, &c. *Dose.*—5 to 15 grs.

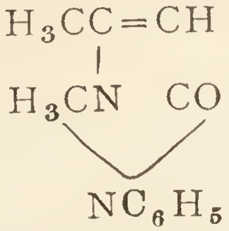
6. **Malakine.** *Syn.—Salicyl-para-phenetidin.*—Insoluble in water. Light yellow silky needles. Anti-rheumatic, analgesic, antipyretic, without any untoward effects. Sometimes acts as a vermifuge. *Dose.*—10 to 20 grs.

7. **Phesin.**—A sulpho-derivative of para-phenetidin. In brownish-yellow, amorphous powder, soluble in water. Acts like phenacetin, without untoward effects. *Dose.*—5 to 10 grs.

8. **Phenocoll Hydrochloridum.**—A product of glycocoll on phenetidin. Colorless crystals, soluble in water. Analgesic, antiperiodic, and intestinal antiseptic. Useful in acute rheumatism, malaria, typhoid fever, &c. Externally as a substitute for iodoform. *Dose.*—5 to 10 grs. **Salocoll** is a phenocoll salicylate given in 15 to 20 grs.

9. **Triphenin.** *Syn.—Propionyl-phenetidin.*—A derivative of propionic acid and phenetidin. Colorless, crystalline, sparingly soluble in water. Action like phenacetin. *Dose.*—5 to 10 grs.

PHENAZONUM. Phenazone.



Syn.—Antipyrine. Phenyl-dimethyl-isopyrazolone.

Source.—Obtained from phenyl-hydrazine by interaction with aceto-acetic ether, and the subsequent interaction of the resulting phenyl-methyl-iso-pyrazolone with methyl iodide.

Characters.—Colorless, inodorous, scaly crystals. Taste bitter. Melts at 235·4° F. *Solubility.*—1 in 1 of water, 1 in 1⅓ of alcohol (90 p.c.) or of chloroform, 1 in 40 of ether.

Incompatibles.—Sp. æther. nitrosi, nitrites. Tannic acid in solution, cinchona preparations, copper sulphate, iodine, acids, alkalis, potassium permanganate, corrosive sublimate, sulphate, iodide, chloride of iron, and strong solution of chloral hydrate. Powdered phenazone liquefies when rubbed with butyl chloral hydrate, sodium salicylate and *B*-naphthol.

Action.—Analgesic, antipyretic, nervous sedative. **B.P. Dose** — 5 to 20 grs.

NON-OFFICIAL PREPARATIONS.

1. **Effervescent Antipyrine.**—5 to 10 grs. in 1 dr. An agreeable preparation.
2. **Antipyrine Tablets.**—5 grs. in each.
3. **Ferripyrin.** *Syn.—Ferropyrin.*—A compound of antipyrine 2, in ferric chloride, useful in chlorosis and anæmia. 1 p. c. solution as gonorrhœa injections. Saturated solution, hæmostatic and styptic. *Dose.*—5 to 8 grs.
4. **Hypnal.**—see page 321.
5. **Iodopyrin.**—see page 451.
6. **Migranin.**—see page 287
7. **Pyromidon.**—A methyl derivative of antipyrine. Yellowish-white crystals, soluble in water. Analgesic, antipyretic. *Dose.*—5 to 20 grs. in solution.
8. **Salipyrin.** *Syn.—Antipyrine Salicylate.*—White, sweetish crystals, soluble in water. Analgesic, anti-rheumatic. *Dose.*—5 to 30 grs.
9. **Tolypyrin.** *Syn —Tolylantipyrine, Paratolyl-dimethyl-pyrozolone.* —Action and dose, same as phenazone but is cheaper.
10. **Tolysal.**—A salicylate of tolypyrin in small white crystals, sparingly soluble in water. Antipyretic, analgesic. *Dose.*—5 to 20 grs.
11. **Tussol.** *Syn.—Antipyrine Amygdalate.*—White granular crystals, soluble in water. Said to be useful in whooping cough. *Dose.*—5 to 15 grs. 1 gr. to a child 1 year old.
12. **Anilipyrin.**—Obtained by fusing antipyrine 2, with antifebrin 1. Possesses actions of both. *Dose.*—10 to 15 grs.
13. **Acetopyrin.**—A white crystalline powder, being a combination of phenazone and acetic acid. Anti-arthritic remedy. *Dose.*—7 to 15 grs.

PHARMACOLOGY OF ACETANILIDE, PHENAZONE AND PHENACETIN.

As the actions and uses of these drugs closely resemble one another, one description for all will suffice.

Externally.—Both phenazone and acetanilide are **local hæmostatics**, but the latter is also an **antiseptic**.

Internally. **Gastro-intestinal tract.**—No effect.

Blood is not affected by the ordinary doses, but its color is changed by large doses, owing to the formation of methæmoglobin, which also discolors urine. The red blood corpuscles are broken up and the movements of the white-blood corpuscles are arrested.

Heart.—The heart is depressed, probably by its sedative influence on the cardiac muscle. Acetanilide is the most depressant, next comes phenazonum, and phenacetin has little or no depressant action.

Blood vessels.—Acetanilide and phenazone contract the blood vessels, by acting directly on their muscular fibres. These are therefore **hæmostatics**, phenazone being more energetic than the other. The blood pressure is heightened at first, and is lowered subsequently from cardiac weakness.

Respiration.—The respiratory force is diminished only by toxic doses.

Kidneys.—They slightly increase the flow of urine, urea and uric acid. Large doses alter the color of urine. Phenazone is quickly excreted. Acetanilide is said to be excreted as aniline.

Skin.—Papular, erythematous, or urticarial rashes are observed at times. They may produce a slight diaphoresis in health, but a copious one in pyrexia. Therefore they are **diaphoretics**.

Temperature.—They only slightly reduce the temperature of healthy persons, but are **powerful antipyretics**. This action is mainly due to direct action on the heat-producing centre in the corpus striatum and partly to diaphoresis.

Nervous system.—They are **powerful analgesics**. Acetanilide and phenazone are said sometimes to cause convulsions and motor paralysis.

Toxic action.—Large doses cause great prostration, sometimes vomiting, weak irregular pulse, slow respiration and sweating. In toxic doses these symptoms are aggravated, leading to profuse sweating, cyanosis, collapse and death. Sometimes a rash appears on the skin. Poisoning may occur from phenazone and acetanilide. The writer had a case of poisoning from 30 grs. of phenacetin. Cyanosis of the face, mostly of the lips, hands and feet, and a slight depression were the only prominent symptoms.

Antidotes.—Warmth to the surface, stimulants, strychnine and atropine hypodermically, and oxygen inhalation.

Actions of Phenazone and Phenacetin compared.—Phenazone is the best in respect of the efficacy, rapidity and certainty of its action, while phenacetin is safe, and its action more lasting, never producing subnormal temperature or collapse. Phenacetin has also a soothing and soporific action. Both of them cause profuse sweating *but do not shorten fever.*

THERAPEUTICS OF ACETANILIDE, PHENAZONE AND PHENACETIN.

Externally.—Acetanilide and phenazone are occasionally used as a dusting powder, or as an ointment (20 grs. to 1 oz.) for chronic ulcers and eczema. A 10 p. c. solution of phenazone locally applied, stops **epistaxis**. A more concentrated solution may be used to arrest **post partum hæmorrhage.** Phenazone hypoderemically (5 to 10 grs in water) relieves the pains of **sciatica, lumbago, dysmenorrhœa, biliary and renal colic**, &c. A 50 p. c. solution in the same way, may be used as a **local anæsthetic.** The smarting caused by the subcutaneous injection may be relieved by combining it with cocaine. The local sores it produces are a drawback to its use.

Internally.—Acetanilide is rarely used now-a-days. As an **anæsthetic**, a 30 or 50 p. c. solution of phenazone may be locally applied in sore-throat.

As **antipyretics** all three are used to reduce **feverheat,** but phenacetin, being the safest, is prescribed most frequently. They take about 2 hours to bring down the temperature but phenazone and acetanilide do it most rapidly. To maintain the reduced temperature they require to be repeated every 4 or 6 hours, and this sometimes leads to dangerous symptoms, on account of their depressing influence on the heart. They cannot control the duration of fever. As soon as the effects are over, the fever rushes up again. Hence many physicians are averse to using them as **antipyretics**, as a routine treatment, but they are really very useful agents when in an acute disease we want to reduce the fever immediately. In **hyperpyrexia** they cannot be relied upon. Both phenazone and phenacetin have been given in every manner of **febrile condition with a high temperature,** such as typhus, remittent, intermittent, sunstroke, exanthemata, erysipelas, rheumatism, pneumonia, phthisis, influenza, puerperal fever, but with unsatisfactory results. The modern doctrine of fever is that it is a protective process. We should therefore never use drugs which check heat production, but should rely, for the reduction of temperature, upon those means which promote the dissipation of heat without influencing its production.

As **analgesics** all three may be given to relieve pain, but phenazone is the most powerful in so doing. For reasons already stated, phenacetin will have a preference. There is hardly any pain, which can not be alleviated by phenazone. 10 to 15 grs. given hourly for 3 or 4 doses act like a charm in almost every form of **headache** and **migraine.** Phenacein does it equally well in 5 gr. doses. Moreover, the pains of **ataxy, sciatica, angina,**

internal aneurism, dysmenorrhœa are soon cut short by these drugs. In pleurisy they not only cut short the attack, but relieve the stitch and aid the absorption of the effused fluid.

Phenacetin, in 1 gr. doses, is a useful hypnotic in the febrile diseases of children.

As a **nervine sedative**, phenazone is occasionally used in **epilepsy, chorea, nocturnal emissions, laryngismus stridulus, asthma, sea-sickness, enuresis**, &c.

As a **hæmostatic**, it is given in hæmoptysis, and it is said to rapidly reduce the amount of sugar eliminated in **diabetes**.

Prescribing hints.—All three may be given in powders cachets, or capsules. Phenazone being soluble in water can be given in peppermint water, which disguises its taste, while the others can be suspended by compound tragacanth powder. Sometimes they may be given with advantage in brandy or whisky. Phenazone relieves pain quicker when subcutaneously injected, or they may be administered *per rectum* if necessary. On account of a long list of incompatibles, phenazone is better given alone.

Note.—Caffeine is rendered soluble in one-half of water by the addition of an equal quantity of antipyrine ; and quinine hydrochloride 2 parts, with antipyrine 1 part, will dissolve in 4 parts of water. Without the addition of antipyrine, 68 parts of water would be necessary to dissolve 2 parts of quinine hydrochloride.

PHOSPHORUS. Phosphorus. P.

Source.—A solid non-metallic element obtained from calcium phosphate.

Characters.—A semi-transparent, wax-like solid, emitting white vapors and luminous in the dark ; ignites in the air. *Solubility.*—Insoluble in water ; 1 in 25 of chloroform, 1 in 350 of absolute alcohol, 1 in 80 of olive oil and of ether ; 2 in 1 of carbon bisulphide, 1 in 60 of oil of turpentine. Also in melted fats.

Action.—Nervine tonic and general stimulant. **B.P. Dose.**—$\frac{1}{100}$ to $\frac{1}{20}$ gr. in pill or solution.

Enters into.—The preparation of Calcii Hypophosph., Acid phosph. concent. and the

OFFICIAL PREPARATIONS.

1. **Oleum Phosphoratum.**—1 p. c. A clear straw-colored oil. For its unpleasant taste, it is rarely prescribed. **B.P. Dose.**—1 to 5 ms.
2. **Pilula Phosphori.**—1 in 90. (see p. 89.) **B. P. Dose.**—1 to 2 grs. *i.e.* $\frac{1}{50}$ to $\frac{1}{25}$ gr. of phosphorus.

NON-OFFICIAL PREPARATIONS.

1. **Elixir Phosphori B.P.C.**—Tr. Phosph. Co. 1, Glycerin 4 ; mix and agitate. Palatable and well borne by the stomach. *Dose.*—15 to 60 ms. in water. Contains $\frac{1}{15}$ gr. phosphorus in 1 dr.
2. **Perles of Phosphorated oil.**—Contains phosphorus $\frac{1}{100}$, $\frac{1}{50}$ and $\frac{1}{32}$ gr. in each *Dose.*—1 after meals.
3. **Tr. Phosphori Comp. B.P.C.**—Contains $\frac{1}{10}$ gr. of phosphorus

in 1 dr. Dissolve Phosphorus 12 grs. in Chloroform 2½ ozs. within a stoppered bottle on a water bath, and then add ethylic alcohal 12½ ozs. shake well. *Dose.*—3 to 12 ms. Preserve from light.

4. **Zinci Phosphidum. U. S.**—A grey crystalline powder. Recommended as a substitute for phosphorus. *Dose.*—$\frac{1}{20}$ to ⅓ dr.

PHARMACOLOGY.

Phosphorus has a specially interesting physiological action, but its therapeutic value is unfortunately limited. As a poison it is important.

Externally.—Undiluted phosphorus is a strong local **irritant** and **caustic.**

Internally.—In its solid form it has the same local action.

Blood.—It is absorbed into the blood partly unchanged, and partly as an oxidised product, phosphorus or phosphoric acid. This oxidation possibly occurs at the expense of the oxyhæmoglobin. Many authorities do not believe this latter theory.

Stomach and liver.—In very minute doses, it is said to sharpen the appetite, and in moderate doses it increases the development of the **connective tissue** of the stomach and liver, and induces a sort of chronic inflammation of the organs, thus, atrophy of the gastric follicles and cirrhosis of the liver are the results. The **glycogenic function** of the liver too is reduced to nil, and fatty degeneration ensues. In toxic doses, it is a **gastro-intestinal irritant**, producing vomiting and purging, the vomited matters having a garlic odor. These symptoms do not follow *immediately after administration, but may be delayed hours or days.*

Bones.—When continued long in such minute doses as not to affect the stomach or liver, there is an increased osseous deposit, and the cancellous tissue becomes converted into compact bone. These changes are not due to the excess of phosphates produced in the blood, but to the stimulation of the cell growth by the drug itself.

Nervous system.—It is said to act as a **tonic** and **restorative** to the nervous system, supplying it with nutrition, but it is difficult to understand how it can do this, when it arrests oxidation, except on the supposition, that it does so by stimulating cell growth, as in the case of bones. It is popularly supposed to excite the reproductive centres in the spinal cord, and is therefore regarded by many as an **aphrodisiac**, but the best authorities have now entirely discarded it for this purpose.

Metabolism.—In large doses, it distinctly increases the nitrogeneous products, such as urea, leucin, tyrosin, &c., raises temperature, reduces absorption of oxygen and excretion of carbonic acid, and leads to **fatty degeneration** of the glandular, muscular and epithelial protoplasm throughout the body. The urea, &c., being soluble, are excreted by the kidneys, whose action they increase, but the insoluble products, such as fats, and oils are deposited in the various organs.

Acute toxic action.—Acute poisoning may occur from swallowing rat-paste or lucifer match-heads Besides gastro-enteritis already described, there is considerable prostration, and occasionally collapse and death. Generally, these symptoms come on in a mild form, and the patient does well for a few days. Then, after an interval, jaundice is noticed, with a tender enlarged liver. The jaundice soon deepens; vomiting and purging of dark colored blood set in, temperature first rises and then falls; the pulse becomes weak and rapid; the skin cold and clammy; and the urine scanty, high-colored, and albuminous. Muscular twitchings, convulsions or coma supervene, terminating in death. **Fatty degeneration of the liver**, with general ecchymoses and hæmorrhages, are the common P. M. appearances.

Antidotes.—Stomach-pump, copper sulphate is the appropriate emetic (see p. 369). It should be given in 3 grs. doses every 5 minutes till vomiting takes place, and then 1 gr every quarter of an hour as an antidote. If rejected, give it with morphine solution (10 ms.). Ozonised oil of turpentine 30 ms. every half hour. This acts by converting the phosphorus into hypophosphoric acid. The French turpentine is the best. *New* turpentine is *worse than useless.* Mag Sulph. ½ oz. as a purgative, and demulcent drinks may also be given. Avoid fats, butter and oils which dissolve phosphorus.

Chronic toxic action.—Chronic poisoning is rare, *and occurs only in those workmen who are exposed to the fumes* of phosphorus. Gastro-enteritis, fatty degeneration, **necrosis of the jaw**, general tuberculosis are the prominent symptoms. It is asserted that phosphorus fumes attack the bone through carious teeth or spongy gums, but this effect is not produced by its internal administration. Oil of turpentine is an antidote.

THERAPEUTICS.

Internally.—The use of phosphorus is limited.

As a nervine tonic, it has been given in **nervous exhaustion** during convalescence from acute illness, **over-taxation of the brain** from prolonged strain and overwork, and such diseases as are characterised by **softening** or **atrophy** of the **nerve centres** It is occasionally recommended in functional impotence and in many other nervous disorders, such as neuralgia, melancholia, adynamic conditions following typhoid and remittent fevers, pneumonia, and neurasthenia, &c., but the student is advised to avoid the use of this and all other so-called *aphrodisiacs*, which, as a rule do more harm than good.

As a restorative or a stimulant to the cell growth, it has been given in affections dependent on malnutrition, such as **anæmia**, **leucocythæmia**, with occasional success. Dr. Kassowitz obtained very good results in the rickets of children; the dose being $\frac{1}{120}$ to $\frac{1}{80}$ gr. *per diem* for a child weighing 12℔s. But Whitla apprehends danger of the bones hardening in their bent condition. It is no doubt useful in **ununited fractures**, *especially during pregnancy*, and in **osteo-malacia**. Cases of **tubercular menin-**

gitis, diabetes, and **lymphadenoma** have improved under treatment by this drug.

Prescribing hints.—All phosphorus preparations should be given with caution. It is safe to commence with $\frac{1}{80}$ gr. dose, but in sexual debility large doses such as $\frac{1}{30}$ to $\frac{1}{20}$ gr. are necessary at times. The B.P. oil is best administered with cod-liver oil (30 to 40 ms. in 6 ozs.) in 1 dr doses. Gelatin capsules or perles containing oil are elegant. Elixir phosphori is the best preparation. Phosphorus is to be given after meals. Sometimes it gives rise to bad eructations.

In **neurasthenia** the following prescription forms a very good combination.—Ferri Redacti 2 grs., Strychnine $\frac{1}{36}$ gr., Pil Phosph. 2 grs., m. ft. Pil 1 mitte. 30. Twice daily after meals.

CALCII HYPOPHOSPHIS.

Calcium Hypophosphite.

$Ca(PH_2O_2)_2$.

Source.—Obtained by the interaction of phosphorus, calcium hydroxide and water. $3Ca(HO)_2 + 8P + 6H_2O = 3Ca(PH_2O_2)_2 + 2PH_3$.

Characters.—A white, crystalline, pearly salt. Taste bitter, nauseous. *Solubility.*—1 in 8 of water, insoluble in alcohol (90 p.c.).

Action.—Nervine tonic. **B.P. Dose.**—3 to 10 grs.

NON-OFFICIAL PREPARATIONS.

1. **Syr. Calcii Hypophosph. B.P.C.**—1 gr. in 1 dr. Calcium Hypophosph. 160 grs., Distilled Water 9 ozs., dissolve and filter. Add and dissolve sugar 16 ozs., with the aid of gentle heat. After cooling, add Hypophosphorous acid 20 ms., and Distilled Water *q.s.* to 20 ozs. *Dose.*—1 to 4 drs.
2. **Saccharated Wheat-Phosphates.**—The organic phosphates and cerealin of the bran, combined with milk sugar, are useful for weak and rickety children to aid the assimilation of food and such drugs as iron. *Dose.*—$\frac{1}{2}$ tea-spoonful or more as sugar with food.

SODII HYPOPHOSPHIS.

Sodium Hypophosphite.

$NaPH_2O_2$.

Source.—Obtained by the interaction of sodium carbonate and calcium hypophosphite. $Na_2CO_3 + Ca_2PH_2O_2 = 2NaPH_2O_2 + CaCO_3$.

Characters.—A white, granular, deliquescent salt, taste bitter, nauseous. *Solubility.*—1 in 1 of water.

Action.—The same as of calcii hypophosphis. **B.P. Dose.**—3t 10 grs.

PHARMACOLOGY AND THERAPEUTICS OF CALCIUM AND SODIUM HYPOPHOSPHITES.

Internally.—The actions of these salts resemble those of phosphate of lime, but not of free phosphorus. They are probably converted into phosphates in the stomach. Their efficacy in **phthisis** has been doubted, but there is evidence to shew that in the first stage they are more useful than in the second or third. In fact, if any benefit is derived from them, it is due to their **general alterative** effects, rather than to their specific action on the disease. They give better results in **chronic bronchitis** with emaciation, profuse expectoration, and sweating in young individuals. They may be used in the same class of diseases in which phosphate of lime is indicated. Parrish's Chemical food, Fellow's syrup, Syr. Calcii Lactophosph. B P. or Glycerophosphate of lime are valuable preparations to select from.

PHYSOSTIGMATIS SEMINA. Calabar Bean.

N.O. *Leguminosæ.*

Syn.—Ordeal Bean

Habitat.—Western Africa.

Source.—The ripe seeds of *Physostigma venenosum.*

Characters.—Large, reddish-brown, oblong-reniform; 1 in. long, ¾ in. broad, ½ in. thick, with a broad black furrow extending the entire length of the curved margin. Testa hard, thick, rough, enclosing two starchy cotyledons, between which there is a cavity. No odor. No taste.

Identification.—They are easily identified, none in the B. P. resemble them. Student should also note the color, size and the black furrow.

Composition.—(1) *Physostigmine* or *Eserine* is the chief constituent. (2) *Calabarine*, a secondary alkaloid, antagonistic in action to physostigmine.

Action.—Antispasmodic, myotic and expectorant.

OFFICIAL PREPARATION.

1. **Extractum Physostigmatis.**—A dark brown firm extract. **B.P. Dose.**—¼ to 1 gr. in pill.

NON-OFFICIAL PREPARATION.

1. **Tinctura Physostigmatis. B.P.C.**—Calabar bean 1, Alcohol (90 p c.) 5. *Dose.*—5 to 15 ms.

PHYSOSTIGMINÆ SULPHAS. Physostigmine Sulphate.

$(C_{15}H_{21}N_3O_2)_2, H_2SO_4,XH_2O.$

Syn. B.P.—Eserine Sulphate.

Source.—The sulphate of an alkaloid obtained from calabar bean

Characters.—Yellowish-white, minute crystals, becoming red by light and air; deliquescent; taste bitter. *Solubility.*—Very soluble in water and alcohol.

B.P. Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ gr.

OFFICIAL PREPARATION.

1. **Lamellæ Physostigminæ.**—Contains $\frac{1}{1000}$ gr. of physostigmine sulphate in each. Used to contract the pupil.

NON-OFFICIAL PREPARATIONS.

1. **Guttæ Physostigminæ cum Cocaina.** R. O. H.—Physostig. Sulph. and Cocaine Hydrochloride 1 to 100.
2. **Injectio Physostigminæ Sulph. Hypodermica.**—4 grs. to 1 oz. *Dose.*—1 to 4 ms.
3. **Hypodermic Tablets.**—$\frac{1}{100}$ gr. in each.
4. **Physostigminæ Hydrobromidum.**—In fibrous masses, soluble in water. *Dose.*—$\frac{1}{30}$ to $\frac{1}{20}$ gr.
5. **Physostigminæ Salicylas.** *Syn.—Eserine Salicylas.*—In colorless, shining, acicular crystals, soluble 1 in 1 of water, which becomes red after a few days. *Dose.*—$\frac{1}{60}$ to $\frac{1}{20}$ gr.

PHARMACOLOGY.

Externally.—None any where except on the eyes.

Eye.—Applied locally to the conjunctiva, physostigmine is absorbed and produces the following changes,—(1) **contraction of the pupil**; (2) **spasm of accommodation**, preceded briefly by an increased accommodation for near objects; and (3) **diminished intra-ocular tension.** All these actions are due to the *direct stimulation of the circular fibres of the iris and ciliary muscles*, but not to the paralysis of the sympathetic, as is shown by the following observations:—

1. Pupil contracted by physostigmine will dilate if suddenly shaded, or if the cervical sympathetic is stimulated.
2. The contraction produced by physostigmine is much greater than that caused by section of the sympathetic.

It follows therefore that the myosis is not due to paralysis of the sympathetic, but to stimulation either of the oculo-motor nerve-endings or the sphincter itself. *The following considerations show that it is the sphincter itself that is concerned.*—

1. A pupil dilated by atropine can be made to contract with physostigmine.
2. Atropine paralyses the nerve-endings but not the muscle itself. Physostigmine can therefore only act on the latter.
3. Myotic poisons which act only on the nerve-endings (as pilocarpine, muscarine, &c.) do not counteract the midriasis caused by atropine.

Internally **Mouth.**—Physostigmine **increases** the **salivary secretions** by directly stimulating the salivary cells (See page 123.) This increased salivation is not checked by atropine, but it stops as soon as the contraction of the blood-vessels begins, which no doubt reduces the circulation in the glands.

Stomach and intestines.—Physostigmine is readily absorbed by the stomach. Small doses produce colic, retching, or vomiting and large doses diarrhœa. This is caused by the increased and irregular peristalsis, from the direct stimulation of the involuntary muscular coats, which become strongly contracted and anæmic.

Heart and circulation.—Physostigmine enters the blood unchanged. In small doses it increases the **contractile force** of the heart, while in toxic doses it **arrests it in diastole**, due to first stimulation and subsequent depression of the cardiac centre. In the same way excitability of the peripheral terminations of the vagus in the heart is increased. In large doses opposite results are observed, whereby **slowing of the heart's beats** occurs. Thus on the whole, the **pulse beats forcibly, but slowly**.

The **blood pressure too rises** from the increased contractile force of the heart, aided partly by, (*a*) the contraction of the arteries, and partly by, (*b*) the tetanic contraction of the intestinal tract.

Respiration.—This is at first **quickened** but soon **depressed**. Death happens from asphyxia. The acceleration is caused (1) by the paralysis of the respiratory centre of both the medulla and the cord, (2) by the stimulation of the peripheral terminations of the vagus in the lungs, and by the (3) spasmodic contraction of the bronchial tubes.

Brain.—Consciousness is not affected even by toxic doses, and the mind remains clear to the last. The **pupils may be contracted** but not, as a rule, to any great extent.

Medulla.—The respiratory and cardiac centres are affected.

Spinal cord.—Physostigmine produces most characteristic symptoms here. It markedly **depresses the anterior cornua** of the cord, thereby **abolishing reflex excitability** and producing **motor paralysis**. There may be a slight **increase of reflex excitability** in the beginning. The **posterior cornua** of the cord are affected to a less extent later on, and consequently there is some loss of sensation

Muscles.—Marked fibrillar contractions of the skeletal muscles are often seen after death. This is due to their direct stimulation by the poison, for it takes place also when the nerve-centres have been paralysed by chloral, or the motor nerves by curare, or when the nerves have been divided. The sensory nerves remain unaffected The involuntary muscles of almost every organ, such as stomach, intestines, bladder, heart, arteries spleen, uterus, iris, &c., are more or less stimulated. Physostigmine acts directly upon the muscle-substance and not upon the nerve endings.

Secretions.—Not only saliva, but sweat, tears and buccul mucus are also increased, this is due to direct stimulatian of the glandular protoplasm.

Elimination.—Physostigmine is excreted by the liver and salivary glands, not by the kidneys.

Antagonists.—Atropine, chloral, strychnine and morphine.

Antidotes—Poisoning by calabar bean is rare. Emetics or pump. Tannin. Atropine $\frac{1}{30}$ gr. hypodermically till the pupils dilate well. Chloral and strychnine are also used, artificial respiration overcomes respiratory trouble.

THERAPEUTICS.

Externally. **Eye.**—Eserine is chiefly used in **ophthalmic practice.** Guttæ or lamellæ physostigminæ may be used (1) to contract the pupil in photophobia, and diminish the amount of light falling on a sensitive retina; (2) to break up adhesions in iritis; (3) to prevent prolapse of the iris after corneal wounds, ulcers or perforations; (4) to reduce intra-ocular tension in glaucoma and perforating keratitis; (5) to stimulate the paralysed ciliary muscles and iris; (6) to counteract the effects of atropine; and (7) in detachment of the retina.

As a **motor paralyser** calabar bean is chiefly used in **tetanus.** Dr. Fraser who brought the drug prominently before the profession, recommends its use at the very outset. It must be boldly pushed till the physiological effects are developed, in fact a little short of poisoning. If the patient cannot swallow, it may be given by the rectum or subcutaneously. The patient should be watched. It is used with more or less benefit in many other convulsive diseases, such as **chorea, paralysis agitans, acute mania.** Though physostigmine is an antidote to strychnine, atropine and chloral it is rarely used in **poisoning by these drugs.**

As a **stimulant to the involuntary muscles** it may be given in **constipation, bronchitis,** and **atony of the bladder,** but it is rarely used for this purpose.

PICRORHIZA. Picrorhiza. N. O. *Scrofulariaceæ.*

(*Ind. and Col. Addendum*).

Syn. I. V.—*Kutki, Katki.* Beng., Hind. *Katuká,* Sans.

Habitat.—India and Eastern Colonies.

Source.—The dried rhizome of *Picrorhiza Kurroa.*

Characters.—In short pieces, about ¼ in. in diameter, as thick as a goose quill, tapering downwards, beset with prominent scars and remains of the rootlets. The large upper part is beset with dark greyish brown scales. Taste bitter.

Composition.—(1) A bitter glucoside, *Picrorhizin,* yielding as its decomposition product *Picrorhizetin.* (2) Cathartic acid. (3) Gum, &c.

Action.—Stomachic and tonic. **B.P. Dose.**—10 to 20 grs. as a tonic; 40 to 60 grs. as an antiperiodic.

OFFICIAL PREPARATIONS.

1. **Extractum Picrorhizæ Liquidum.**—1 in 1 of alcohol (60 p.c.). **B.P. Dose.**—20 to 60 ms.

2. **Tinctura Picrorhizæ.**—2½ ozs. to 1 pint. By maceration in, alcohol (45 p. c.). **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics

The root is bitter, acrid and stomachic. It is often used with success by the native *Kavirajes* in all forms of **dyspepsia** and **neuroses** of the stomach and bowels. It is a popular remedy with some physicians as an antiperiodic. It acts as a gentle cathartic either when given alone in large doses, or in small doses combined with other purgatives. As a remedy for **bilious fever** *kutki* is often combined with various aromatics and *neem bark.* In the form of a strong decoction, the bark may be prescribed with advantage for dropsies.

PICROTOXINUM. Picrotoxin.

N. O. *Menispermaceæ.*

Habitat.—Southern and Eastern India and Burma.

Source.—A neutral principle obtained from the fruits of *Anamirta paniculata (Cocculus Indicus).* The fruits are known in Britain as Indian berries or fish-berries, and in India as *Kákmári, Kákphala.*

Characters.—Colorless and inodorous crystals ; taste bitter. *Solubility.*—1 in 334 of water and 1 in 13½ of alcohol (90 p. c.). The commercial picrotoxin is not of constant composition. It is stated to contain *Picrotin* 34 p. c. and Picrotoxinin 66 p. c.

Action.—Antiparasitic, anhydrotic. **B.P. Dose.**—$\frac{1}{100}$ to $\frac{1}{25}$ gr. in pill, solution, or hypodermically. **Maximum dose.**—$\frac{1}{10}$ gr. daily.

Non-Official Preparations.

1. **Liq. Picrotoxini Aceticus.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250, filter. Keeps well and is palatable.

2. **Ungt. Cocculi, P. I.** *Syn.—Kákmári Ointment.*—Powdered seeds 80 grs., Prepared Lard 1 oz. mix.

3. **Lamellæ Picrotoxini.**—Each contains $\frac{1}{100}$ gr. for hypodermic injection.

Pharmacology.

Picrotoxin is a powerful poison.

Externally.—It kills low forms of vegetable and animal life, and is therefore **parasiticide.**

Internally.—It stimulates the **respiratory and vagal centres** in the medulla, and the **motor centres** in the cerebrum and cord, thus causing periodic stoppage of diaphragmatic movements, slowing of the pulse, and spasms of the flexors (epileptiform convulsions). Temperature rises somewhat.

Anatagonists.—Chloral hydrate. ($\frac{1}{20}$ gr. of picrotoxin is equal to 30 grs. of chloral).

THERAPEUTICS.

The bitter fruits are used to poison crows and fish, and as a substitute for hops in beer.

Externally.—Picrotoxin ointment (8 grs. to 1 oz) or *kákmári ointment* is chiefly used to destroy **pediculi** and sometimes **tinea capitis**, but it must be applied with caution, lest it be absorbed from the denuded surface and cause poisoning.

Internally.—Picrotoxin is very effective in **checking night sweats of phthisis**, but we cannot say how it acts. It has been used in **epilepsy, paralysis of the muscles** of the **pharynx** and **sick headache**, without much success. It is an antidote to morphine and chloroform asphyxia.

PILOCARPINE.

See Jaborandi, page 461.

PIMENTA. Pimento. N. O. *Myrtaceæ.*

Habitat.—West Indies.

Source.—The dried full grown unripe fruit of *Pimenta officinalis*, the allspice tree.

Characters.—Dark reddish-brown, globular, two-celled fruits, $\frac{1}{5}$ in. to $\frac{1}{3}$ in. in diameter. Pericarp rough, crowned by the remains of a four-toothed calyx, like a raised ring. Each cell contains a single brownish-black seed. Odor and taste like cloves.

Resembles.—Pepper which has no calyx ; cubebs which is stalked.

Composition.—(1) Volatile oil (off), chemically identical with the oil of cloves.

Action.—Aromatic, stimulant and carminative. *Dose.*—10 to 30 grs. in powder.

OFFICIAL PREPARATIONS.

1. **Aqua Pimentæ.**—8 ozs. to 1 gallon. 1 in 20. Carminative. *Dose.*—1 to 2 ozs.
2. **Oleum Pimentæ.**—Distilled from Pimento. Yellow, but becomes brown by keeping. Sinks in water. **B.P. Dose.**—$\frac{1}{2}$ to 3 ms. on sugar, in pill and emulsion.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses of pimento and its oil are identical with those of cloves and of oil of cloves.

PINI OLEUM. Oil of Pine. N. O. *Coniferæ.*

Syn.—Pinol, Pumiline.

Habitat.—Mountains of Central Europe.

Source.—The oil distilled from the fresh leaves of *Pinus pumilio.*

Characters.—Colorless or nearly so. Odor pleasant, aromatic. Taste pungent. Sp. gr. 0.865 to 0.870.

Composition.—Similar to that of the oil of turpentine.
Action.—Stimulant and disinfectant expectorant. *Dose.*—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The action of the oil of pine resembles that of oil of turpentine, except that its smell is more pleasant. When rubbed into the skin, it acts as a local stimulant and **rubefacient,** and is used in **chronic rheumatism, lumbago,** &c. Its vapor is a mild **stimulant, antispasmodic,** and **disinfectant** to the respiratory passages, and is serviceable in **bronchitis, phthisis** and **emphysema.** It may be inhaled from a handkerchief, or better through an inhaler. **Vapor Olei Pini** can be made by triturating oil 40 ms., with Mag. Carb. Levis. 20 grs., and adding water to 1 oz. Of this 1 dr. is put into an inhaler containing ½ pint of cold and ½ pint of boiling water.

Internally.—Given internally, it is excreted by the bronchial mucous membrane, stimulating and disinfecting its secretion, and is therefore useful in **bronchitis** and chronic wasting lung diseases. It may be taken on **sugar** or in the form of a **jujube**

PIPER NIGRUM. Black Pepper.

N. O. *Piperaceæ.*

Syn. I.V.—*Gól marich, kála marich,* Beng. *Gól marich,* Hind.

Habitat.—East Indies, such as Java, Sumatra, Malay Peninsula, and Malabar, Travancore where the plant is perennial.

Source.—The dried unripe fruit of *Piper nigrum.*

Characters.—Black, globular, inferior, one-celled fruits, ⅙ in. in diameter. Pericarp deeply and reticulately wrinkled, containing one seed. Odor aromatic. Taste pungent. *Impurities.*—Berries of Embelia Ribes (*Biranga*).

Resembles.—*Pimento,* which bears a calyx, and *cubebs,* which has a stalk.

Composition.—(1) *Piperine,* resolvable into *Piperic acid* and *Piperidine,* a colorless liquid alkaloid. (2) *Oleo-resin,* yielding a *volatile oil* and a *resin.*

Action.—Stimulant, carminative and antiperiodic. *Dose.*—5 to 15 grs.

Enters into.—Pulv. Opii Co. and the

OFFICIAL PREPARATION.

1. **Confectio Piperis.**—1 in 10. A black paste, resembling, and is sometimes called, **Ward's Paste.** Useful in piles. **B.P. Dose.**—60 to 120 grs.

NON-OFFICIAL PREPARATIONS.

1. **Oleo resina Piperis. U.S.**—*Dose.*—¼ to 1 m. in pill.
2. **Piperinum.**—A colorless, crystalline, neutral principle, obtained from black and long pepper. Antipyretic and antiperiodic. Useful in intermittent fever, hæmorrhoids and gonorrhœa. 18 grs. daily cured ague. *Dose.*—2 to 8 grs. in pill.

3. **Piperonal.** *Syn.—Heliotropin.*—Obtained by the oxidation of piperine; in colorless crystals, with a vanilla odor. A powerful harmless antiseptic. *Dose.*—15 to 45 grs. in wafers

4. **Piperidine Guaiacolate.**—In yellowish-white crystals, with a faint guaiacol odor. Recommended in phthisis. *Dose.*—5 to 30 grs.

5. **Piperidine Tartrate.**—White crystals soluble in water. A solvent of uric acid, in gouty deposits and uric acid gravel. *Dose.*—10 to 15 grs. **Max. Dose.**—24 grs. per day.

PHARMACOLOGY.

Externally.—On account of the volatile oil it contains, it is a **rubefacient, counter-irritant,** and afterwards **anodyne.**

Internally.—It is a **stimulant, stomachic and carminative** like pimento. During elimination it **stimulates** the mucous membrane of the **genito-urinary tracts,** and the secretion of the kidneys. In this respect it resembles cubebs. The unabsorbed portion of the drug, in passing over the rectum, restores the tone of the relaxed and chronically inflamed mucous membrane near the anus.

THERAPEUTICS.

Externally.—Like mustard, it may be used as a domestic counter-irritant.

Internally.– Both the black and the white pepper (decorticated black pepper) are used as culinary spices, not only in India, but in other countries. In the form of a gargle or lozenge it may be used in relaxed **sore-throat.** It is given in the shape of confection in **hæmorrhoids,** in **ulcers of the rectum** and **anal fissure,** and in **gonorrhœa** and **gleet.**

PIX BURGUNDICA. Burgundy Pitch.

N. O. *Coniferæ.*

Habitat.—Germany.

Source.—The resinous exudation obtained from the stem of *Picea excelsa,* melted and strained.

Characters.—Hard, brittle, yet gradually taking the form of the vessel in which it is kept, opaque, reddish-brown; fracture clean, conchoidal. Odor aromatic, especially when heated. Taste sweet, aromatic.

Composition.—*Resinous acids* and *volatile oil.*

OFFICIAL PREPARATION.

1. **Emplastrum Picis.**—1 in 2. A rubefacient and stimulant plaster.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is used as a basis for plasters. Being a **mild stimulant to the skin,** it is used in **lumbago** and chronic **joint affections.**

PIX CARBONIS PRÆPARATA.

Prepared Coal Tar.

Syn. I.V.—*Alkátrá*, Beng.

Source.—Prepared by placing commercial coal tar in a shallow vessel and maintaining it at 120°F for one hour, stirring constantly.

Composition.—(1) *Benzene* and homologous hydrocarbons. (2) *Phenols.* (3) Naphthalene, anthracene, &c.

OFFICIAL PREPARATION.

1. **Liquor Picis Carbonis.**—1 in 6. Is the official imitation of **Liquor Carbonis Detergens,** which is an alcoholic solution of common coal tar.

NON-OFFICIAL PREPARATION.

Creolin. *Syn. Commercial.—Liquor Antisepticus.*—A speciality prepared from coal tar, of a dark color. Recommended as an antiseptic: Valuable application in skin diseases as eczema, psoriasis, &c. Serves as a substitute for carbolic acid in Gynæcology. *Dose.*—1 to 5 grs. in phthisis, gonorrhœa, &c., and as an intestinal antiseptic in enteritis.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses of prepared coal tar are identical with those of wood tar, (*q. v.*), except that the former is scarcely used internally. Liqr. Carb. Detergens is the best known remedy for **chronic eczema.** An ointment containing Liqr. Carb. Deter. ½ dr., Liq. Plumbi ½ dr., White Precipitate 15 grs., Vaseline 1 oz. is useful for the same purpose.

PIX LIQUIDA. Tar. N.O. *Coniferæ*

Syn.—Wood Tar. **Syn. Commercial**—Stockholm Tar.

Source.—A bituminous liquid obtained from the wood of *Pinus sylvestris*, and other species of Pinus, by destructive distillation.

Characters.—A dark-brown or blackish, semi-liquid substance; Odor peculiar, aromatic. Sp. gr. 1·02. to 1·15. *Solubility.*—1 in 10 of alcohol (90 p. c.), slightly in olive and turpentine oils.

Composition.—(1) *Creosote.* (2) *Phenols.* (3) *Oil of turpentine.* (4) *Acetic acid.* (5) *Pyrocatechin.* (6) *Toluol* (7) *Xylol.* (8) *Acetone.* (9) Resins, &c.

Action.—Antiseptic, expectorant. *Dose.*—2 to 10 grs. or more in pills or capsules.

OFFICIAL PREPARATION.

1. **Unguentum Picis Liquidæ.**—Black. Too hard to use. Ung. Picis Molle is a softer preparation.

NON-OFFICIAL PREPARATIONS.

1. **Aqua Picis.** *Syn.—Tar Water, Eau de Goudron.*—Tar 1, fine Sawdust 3, mix and add Distilled Water 200. Macerate and filter. *Dose.*—5 to 10 ozs.

2. **Capsules of Tar.**—Contains 5 ms. in each.

3. **Pigmentum Picis Liquidæ.**—Tar 1, Alcohol (90 p. c.) 1. A stimulating application to psoriasis or chronic dry eczema.

4. **Pilula Picis liquidæ.**—Tar 1, Liquorice Powder 1. Mix. *Dose.*—2 or more pills thrice daily.

5. **Syr. Picis Liquidæ U. S., B. P. C.**—Useful in winter cough and chronic bronchitis. Taste is covered by syrup of wild cherry. *Dose.*—1 to 2 drs.

6. **Ung. Picis Molle** (Squire).—Tar (by weight) 5, Yellow Beeswax 1, Almond-Oil 1. Melt and mix.

PHARMACOLOGY.

Externally.—Wood tar resembles oil of turpentine in action, but is not so powerful. As it contains creosote, phenol, oil of turpentine, &c., it is **antiseptic** and a **vascular stimulant.** When rubbed in, it sometimes causes severe inflammation, or pustules, of healthy sensitive skin, especially those parts which are hairy. It is a **sedative** to the nerves. Tar preparations, if used for any length of time, are apt to set up a very troublesome form of **acne,** called by Hebra, **tar acne.**

Internally.—It may cause indigestion, and in large doses symptoms of carbolic acid poisoning (see p. 183). It is absorbed and during elimination exerts a beneficial influence on the chronically inflamed bronchial mucous membrane, **disinfecting, deodorising and checking profuse secretion,** and promoting free **expectoration.** These effects may be obtained according to Yeo., both when used as an inhalation, or spray, and when taken internally.

THERAPEUTICS.

Externally.—Tar water is a stimulating lotion for **wounds** and **sluggish ulcers.** The ointment or pigment is an excellent application for **chronic scaly skin diseases,** such as **psoriasis. Chronic eczema** too is benefited by it.

Internally.—As an expectorant, wood tar only is used for **chronic bronchitis, bronchiectasis** and **winter cough.** It may be given in pills, capsules or syrup. Tar water may be given internally for the same object. Apomorphine combined with the syrup of tar and syrup of the virginian prune makes an admirable cough linctus.

PLUMBUM. Lead. Pb.

Syn. I. V.—*Sisa*, Beng. ; *Sisak*, Sans.

The B. P. salts and preparations of lead are prepared either from (1) the Oxide or (2) the Carbonate.

PLUMBI ACETAS. Lead Acetate.

$Pb(C_2H_3O_2)_2, 3H_2O$.

Syn.—Sugar of Lead.

Source.—Obtained by dissolving lead oxide or lead carbonate in acetic acid. $PbO + 2HC_2H_3O_2 = Pb(C_2H_3O_2)_2 + H_2O$.

Characters.—Small, white, monoclinic prisms, slightly effervescent; odor acetous; taste sweet, astringent. *Solubility.*—1 in less than 3 of water, 1 in 30 of alcohol (90 p. c.). *Impurities.*—Carbonates, chlorides, nitrates and other metals.

Incompatibles.—Mineral and tannic acids and their salts, alkalis, lime water, chlorides, iodides, preparations of opium. Mucilage of acacia and albuminous fluids,

Action.—Sedative, astringent, hæmostatic. **B.P. Dose.**—1 to 3 grs. in mixture or pill.

OFFICIAL PREPARATIONS.

1. **Pilula Plumbi cum Opio**—3 of lead and ½ of opium in 4. Sedative, narcotic and powerful local and general astringent. **B.P. Dose.**—2 to 4 grs.
2. **Suppositoria Plumbi Composita.**—3 grs. of lead and 1 gr. of opium in each. Astringent, anodyne in dysentery, and hæmostatic, without deranging the stomach.
3. **Unguentum Plumbi Acetatis.**—1 in 25. White. Local astringent and sedative to irritable skin affections &c.

LIQUOR PLUMBI SUBACETATIS FORTIS.

Strong Solution of Lead Subacetate.

Syn. B.P.—Goulard's Extract.

Source.—Prepared by boiling together lead acetate, lead oxide and water. $PbO + Pb(C_2H_3O_2)_2 = Pb_2O(C_2H_3O_2)_2$ lead subacetate.

Characters.—A clear colorless liquid, becoming turbid from exposure; taste sweet, astringent; reaction alkaline.

Action.—A powerful irritant and astringent; used only diluted.

OFFICIAL PREPARATIONS.

1. **Liquor Plumbi Subacetatis Dilutus** *Syn. B.P.—Goulard's Lotion, Goulard Water.*—2 drs. to 1 pint. A colorless liquid. Local astringent and sedative.
2. **Glycerinum Plumbi Subacetatis.**—1 in 6 (weight). Astringent and local sedative.
3. **Unguentum Glycerini Plumbi Subacetatis.**—1 in 6. White. Mild local astringent and sedative.

NON-OFFICIAL PREPARATION.

1. **Cremor Lithargyri.**—Solution of lead subacetate 1, Cream 7; mix. Useful in eczema.

PLUMBI CARBONAS. Lead Carbonate.

$2PbCO_3, Pb(HO)_2$.

Syn.—White Lead. **Syn. I. V.**—*Safedá*, Beng. Hind.

Source.—Prepared by the interaction of lead, water and carbonic anhydride in the presence of vapors of acetic acid.

Characters.—Soft, heavy, white powder. *Solubility.*—Insoluble in water, soluble in dilute acetic acid.

Action.—A mild astringent and sedative, used only externally.

OFFICIAL PREPARATION.

1. **Unguentum Plumbi Carbonatis.**—1 in 10. Cream-colored. Used in excoriated inflamed surfaces, and burns.

PLUMBI IODIDUM. Lead Iodide. PbI_2.

Source.—Obtained by the interaction of lead nitrate or acetate and potassium iodide.

Characters.—A heavy bright yellow powder. *Solubility.*—1 in 2000 of cold water, and 200 of boiling water.

Action.—Resolvent, antiparasitic.

OFFICIAL PREPARATIONS.

1. **Emplastrum Plumbi Iodidi.**—1 in 10. Bright yellow solid. Resolvent, alterative. In chronic enlargements of glands.
2. **Unguentum Plumbi Iodidi.**—1 in 10. Yellow. In ringworm and enlarged glands.

PLUMBI OXIDUM. Lead Oxide. PbO.

Syn. B. P.—Litharge. **Syn. I. V.**—*Mudrá sung*, Beng. Hind.

Source.—Prepared by the action of air on melted lead. $Pb_2 + O_2 = 2PbO$.

Characters.—Pale, yellowish-red, heavy scales. *Solubility.*—Completely in dilute nitric and acetic acids, insoluble in water. *Impurities.*—Iron, copper, carbonates

Enters into.—The preparation of Liq. Plumb. Fort., Plumbi Acetas, Glycerinum Plumb. Subacetatis and the

OFFICIAL PREPARATION.

1. **Emplastrum Plumbi.** *Syn.—Diachylon or Lilharge Plaster.*—A pale yellow solid, being a crude oleate, palmitate and stearate of lead. Speaking *chemically* it is *soap*. A sedative and protective application.

Enters into.—Emp. Hydrarg., Emp. Plumbi Iodidi, Emp. Resinæ, Emp. Saponis.

NON-OFFICIAL PREPARATION.

1. **Ung. Diachylon Hebræ** (modified by Kaposi).—Lead Plaster 1, Soft Paraffin 1 ; melt with heat. Useful in eczema, excessive perspiration of feet and sycosis.

ACTIONS AND USES OF LEAD OXIDE.

The oxide has desiccant properties but is scarcely ever used. The plaster of lead is the basis of most of the plasters. It serves mechanically to hold the lips of *wounds* together, to protect **irritable surfaces**, and by its pressure to help the |absorption of **effused products** or **indolent enlargements.**

PHARMACOLOGY OF LEAD SALTS.

Externally.—Lead salts have a feeble action on the unbroken skin, but on denuded and exposed mucous surfaces, wounds and ulcers, they produce the following definite effects.—They (1) **precipitate the albumen of discharges**, and form an impervious coating on the surface ; (2) **coagulate the albumen of tissues** and condense them ; (3) **constrict the blood-vessels** of the part, and arrest the escape of plasma and corpuscles ; and (4) **epress the local nerves**, and allay itching. Thus they are local **astringents, antiphlogistics,** and **nervine sedatives.**

Internally. **Gastro-intestinal tract.**—Insoluble lead salts are tasteless. Soluble salts have a sharp astringent and sweetish taste. The same local actions as on the skin, occur in the mouth, stomach and intestines. Soluble salts are converted into an albuminate, partly in the mouth, and partly in the stomach and intestine, and are absorbed as such. Whatever remains unabsorbed is eliminated as a sulphide with the fæces, to which it imparts a leaden hue. In the intestines, lead salts perform three distinct functions, *viz.*,—(1) they check the secretion of succus entericus, (2) constrict the arteries, and (3) arrest or retard peristalsis. They are therefore powerful **intestinal astringents** and **hæmostatics**, producing constipation and arresting any hæmorrhage that may exist. They diminish the secretion of bile.

Blood.—Lead salts are supposed to enter the blood as an albuminate, chiefly by the gastro-intestinal tract and skin, but occasionally by the respiratory tract. The plasma is said to become more watery, hæmoglobin is diminished, and the red blood corpuscles are reduced in number. Thus they induce a **sallow anæmia.**

Tissues.—Lead is freely taken up by, and retained in, the tissues of the body. The central nervous system, liver, kidneys and bones, are the principal seats of deposit. Thus, being intimately connected with growing cells, it produces certain pathological effects, which are know as "*Plumbism.*"

Elimination.—Lead is slowly excreted by the urine, bile, sweat, milk, and chiefly by the intestines. It checks excretion, of **urates** and predisposes to gout.

Acute toxic action.—Concentrated solutions of lead salts are irritant. Acute poisoning is rare. Burning pain in the stomach, dryness of the throat, thirst, vomiting, colic, constipation with slate colored stools, cold sweats, cramps in the legs, collapse ; sometimes even stupor, coma, and convulsions, are some of the symptoms induced by the acetate.

Antidotes.—Stomach pump, zinc sulphate both as an emetic and antidote, followed by milk or the white of egg ; dilute sulphuric acid. Sodium and magnesium sulphates are chemical antidotes, for they produce insoluble sulphates and open the bowels. Morphine or demulcent drinks to relieve colicky pain.

Chronic toxic action, "Plumbism."—Chronic poisoning by lead is very common and originates from the slow absorption and retention of minute quantities of the drug Lead is therefore a **cumulative** poison. Workers in lead factories, and those who constantly handle lead are very prone to poisoning, for they generally contaminate their food by their unwashed hands. Some wines, cosmetics, hair-dyes, snuff packed in lead-foil, and drinking water stored in lead cisterns and pipes are also sources of danger.

The **symptoms** are characteristic. Besides impaired digestion, constipation, a sweetish taste in the mouth and intestinal colic, the formation of a **blue line** on the edge of the gums, most marked near the incisors, is an early symptom. It is due to the deposit of lead sulphide, the sulphur being obtained from the food and the tarter of the teeth For the same reason a blue line may be noticed round the anus. **Severe cramps** in the calves of the legs next appear, followed by **paralysis of the extensors of the forearm**, leading to **wristdrop.** The latter symptom is due to chronic inflammation of the peripheral motor nerves supplying these muscles. The affected muscles become the seat of fatty degeneration, but it is to be noted that the supinator longus usually escapes. The paralysis may extend to other muscles, and there may be general paraplegia or hemiplegia. Occasionally the anterior cornua of the spinal cord waste. The sensory fibres are not often affected, hence pain or numbness is rare.

Saturnine lunacy and **Saturnine epilepsy** may arise as the result of the action of the poison upon the nervous centres. Also **optic neuritis** and **blindness** As lead prevents the **excretion of urates** from the blood, gouty inflammation of joints often ensues, and specially so in patients with a gouty diathesis. Chronic lead poisoning is also a very common cause of **granular kidney**, but we do not know whether this is due to the irritation caused by the lead salts, or to the gouty conditions produced by them. **Abortion** is a frequent complication.

Treatment.—Avoidance of the poison. Alum and belladonna to relieve pain and constipation. Potassium iodide to dissolve insoluble compounds and magnesium sulphate to remove them from the system, and prevent their re-absorption after they have been eliminated into the intestines. Morphine subcutaneously for colic, sulphur baths to help elimination by the skin, electricity and friction to paralysed muscles.

Lemonade, made with acid sulph. dil. instead of tartaric or citric acids, a milk diet, and strict personal cleanliness are the best methods of prophylaxis.

THERAPEUTICS OF LEAD SALTS.

Externally.—The uses of many of the preparations of lead have been briefly alluded to under their respective heads.

Generally speaking, lead salts are useful in a variety of diseases :—(1) To *soothe irritation and control excessive discharge*, the lotions and ointments are employed in inflamed painful weeping **eczema**, irritable **ulcers** and **wounds**. The injection may be used with benefit in **vulvitis**, **leucorrhœa gonorrhœa**, **gleet**, **otorrhœa**, &c. A lead and opium lotion. (Ext. opii 5 grs., Liq. Plumb. subacet. dil 1 dr., and water to 1oz.) is a good sedative and antiphlogistic application to **bruises**, **sprains** and other **cutaneous inflammations**, such as **erysipelas**, &c. Diachylon ointment, alone or combined with zinc oleate or mercuric oleate ointments, makes a very effective non-irritant application. Lead collyria should never be used in **ulcerated cornea**, as a deposit of white lead may form, causing permanent opacity and blindness. (2) To *allay irritation and itching*, a lotion or ointment is used in **pruritus pudendi** (the cause being first removed), **urticaria**, &c. (3) To *promote absorption* of morbid products, mechanically or otherwise, lead plasters are applied to **indolent glandular enlargements**, and **swollen joints**. (4) To *arrest local hæmorrhages*, lead salts are never used. (5) As an *antiparasitic*, iodide of lead ointment is used in **ringworm**.

Internally.—For its local astringent effects, Glycerinum Plumbi Subacetatis, or a gargle can be used in **tonsillitis**, **pharyngitis**, &c. Lead acetate is the only salt that is used internally. Its chief use is to check severe **diarrhœa** and **hæmorrhage** from stomach and bowels as in **typhoid fever**, and **tuberculosis**. Pilula Plumb. c. Opio is a very valuable preparation in such cases. Lead suppository or an enema of acetate of lead may be employed to arrest **rectal hæmorrhages**, and as an **astingent** in **chronic dysentery**. It is doubtful whether lead has any effect in **hæmoptysis**, though many physicians still prescribe it for this purpose, in combination with morphine.

PODOPHYLLI RHIZOMA. Podophyllum Rhizome.

N. O. *Berberidaceæ.*

Syn. B. P.—Podophyllum Root.

Habitat.—North America.

Source.—The dried rhizome and roots of *Podophyllum peltatum.* American May Apple, or Mandrake.

Characters.—Dark, reddish-brown, smooth, or slightly wrinkled, cylindrical pieces ; several inches long, $\frac{1}{6}$ to $\frac{1}{3}$ in. thick ; presenting at intervals enlargements, which are marked on the upper surface by a depressed circular scar, and on the under surface stout, brittle rootlets, or their scars. Fracture short. Internally white, starch-like, or pale, yellowish-brown and horny. Odor characteristic. Taste bitter, acrid.

Composition.—*Resin* is the chief ingredient. It is composed of (1) *ether soluble* and (2) *alcohol soluble* resins, which contain an active purgative crystalline body. (3) *Podophyllotoxin*, which again splits up into (a)

Picro-podophyllic acid, an inert body, and (b) *Picro-podophyllin*, a crystalline neutral substance, the active principle.

Action.—Cholagogue and hydragogue purgative. *Dose.*—10 to 20 grs.

Official Preparations.

1. **Podophylli Resina.** *Syn.—Podophyllin, Vegetable Calomel.*—A pale-yellow to orange-brown amorphous powder, prepared by extracting the root with alcohol (90 p. c.), and precipitating the resin with water; soluble in alcohol and ammonia. *Incompatibles.*—Water precipitates it from the alcoholic solution, and acids from the ammonia solution. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr.

2. **Tinctura Podophylli.**—2 grs. of resin in 1 dr. **B.P. Dose.**—5 to 15 ms.

Non-Official Preparations.

1. **Podophyllotoxin**—More certain in action and said not to cause after constipation *Dose.*—$\frac{1}{10}$ to $\frac{1}{8}$ gr., for an adult; $\frac{1}{40}$ to $\frac{1}{30}$ gr. to children. 1 gr. dissolved in 2 drs. of alcohol (90 p. c.) best given in syrup or on sugar in 2 to 10 drop doses.

2. **Tinctura Podophylli Ammoniata.**—Podophyllum resin 1, Sp. Ammon. aromatic 50; dissolve and decant. Water does not precipitate the resin, which is a distinct advantage. A powerful hepatic stimulant, and purgative. *Dose.*—10 to 20 ms. as a purgative.

Pharmacology.

Externally.—The resin acts as an irritant to the unbroken skin. The dust coming in contact with the eyes causes conjunctivitis. It is absorbed by raw surfaces and produces its specific effect, *i.e*, purgation.

Internally. **Gastro-intestinal tract**—Being bitter and acrid in taste, podophyllin may excite salivation. In purgative doses, it causes griping, perhaps nausea, and within 10 to 12 hours a free watery stool The purgative virtue is due to (1) the **increased secretion** from the intestinal glands, (2) the **increased peristalsis**, and (3) the **increased flow of bile**. Much of the force of the drug is directed to the small intestine, more specially the duodenum whose contents, it sweeps down rapidly, in which respect it resembles calomel. Hence it has received the name of "vegetable calomel." Beyond this, it has none of the other properties of calomel Impure resin produces more griping, and common salt increases its cathartic effect. Therefore, it is a powerful hydragogue purgative. In large doses it gives rise to **gastro-intestinal irritation**, and sometimes causes death. Bile dissolves the drug. As a purgative its action varies with different individuals. Some are more susceptible than others.

Liver.—In *small doses* it is a powerful **hepatic stimulant**, increasing the amount and solids of the bile. In doses sufficient to act as a purgative, although the bile flows more freely from the gall-bladder to the duodenum, the drug is swept rapidly down the canal, without giving it time to be absorbed, consequently the biliary secretion is less stimulated than it would be by smaller doses. The old view was that it increases both *secretion* and *excretion* of bile and that it was therefore both a **direct** and **indirect cholagogue**, but this has lately been disputed

Absorption.—It is absorbed by raw surfaces, mucous and serous membranes and cellular tissue It produces its specific effects even when injected into the veins.

Therapeutics.

Internally.—As a **purgative** it is an excellent remedy for **constipation**, due to hepatic disorder or otherwise ; the griping being corrected by Hyoscyamus, Belladonna, or Cannabis Indica. Its action becomes more uniform and certain, when combined with other purgatives, *e.g.*, aloes, jalap, colocynth, rhubarb. Calomel and podophyllin make a very advantageous combination, as they aid each other's actions on the same portion of the intestine. Being a **cholagogue** as well, it is best suited for **constipation**, caused by the **torpid condition of the liver, biliousness** or **hepatic dyspepsia** $\frac{1}{6}$ to $\frac{1}{4}$ gr. can be recommended as a ordinary dose for habitual constipation, but $\frac{1}{4}$ to $\frac{1}{2}$ gr. should be given in **obstinate costiveness** or to relieve **portal congestion**. Sometimes larger doses are necessary. Ringer considers it an efficacious remedy for **infantile constipation**, with hard, lumpy, clay-colored stools. 1 gr resin may be dissolved in 1 dr. of alcohol (90 p. c.), and of this, 1 or 2 drops on a lump of sugar or with honey, 2 or 3 times a day. Whey, sharbet, mucilaginous drinks stop excessive purging

As a pure **hepatic stimulant** it must be given in non-purgative doses ($\frac{1}{30}$ to $\frac{1}{20}$ gr.), in many **functional disorders of the liver**, characterised by metallic taste in the mouth, dull depressed spirits, sluggish bowels, sick-headache, &c. According to Ringer, small doses are highly useful in some forms of **chronic diarrhœa**, marked by highly colored motions and cutting pains, or by pale, watery, frothy motions with severe griping ; and in **diarrhœa** occurring in the morning and ceasing in the day, only to return next morning. One or two drops of the alcoholic solution may be given 3 or 4 times a day.

Prescribing hints.—One of the best ways of giving podophyllum is to dissolve it in Sp. Ammon. Aromat. (1 gr. to 1 dr), as the resin then remains in solution on the addition of water and is not precipitated as it is if you use the B.P. tincture. **Pill for habitual constipation and torpid liver.**—Podophyll. Res. $\frac{1}{6}$ gr., pulv. Ipecac. $\frac{1}{6}$ gr., Ext. Euonym. sic. 1 gr., Ext. Nucis Vom. $\frac{1}{6}$ gr., Ext. Hyoscyamus $\frac{1}{2}$ gr., Pil. Rhei Co. 11 gr. m. ft. Pil. mitte Tales xii. Twice daily after breakfast and dinner.

PODOPHYLLI INDICI RHIZOMA.

Indian Podophyllum.

(Ind. and Col. Addendum.)

Habitat.—Indian and Eastern Colonies.

Source.—The dried rhizome and roots of *Podophyllum Emodi.*

Characters.—Horizontal, more or less cylindrical and contorted, $\frac{1}{4}$ to $\frac{1}{8}$ in. thick, crowded above with tuberosities, marked by depressed scars; giving off numerous simple rootlets from the under surface. Earthy brown. Faint odor, bitter taste.

Composition—Indian Podophyllum contains double the amount of resin yielded by *Podophyllum Peltatum* but the resin contains only half the quantity of crystalline *picropodophylline* to which the value as a cathartic is due.

OFFICIAL PREPARATION.

1. **Podophylli Indici Resina.**—A powdered resin obtained from *Podophyllum rhizome* and resembling Pod. resin. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr.

2. **Tinct. Podophylli Indici.**—Ind. Podophillum resin 1, Alcohol 3(90 p. c.). **B. P. Dose.**—5 to 15 ms.

PHARMACOLOGY AND THERAPEUTICS.

Precisely as the other variety (see p. 549). The resin however is not quite so powerful as a purgative and it does not answer to the B. P. tests It *gelatinises* with a solution of ammonia, and cannot therefore be administered dissolved in Sp. Ammon Aromatic.

POTASSIUM. Potassium. K.

POTASSA CAUSTICA. Potassium Hydroxide. KOH.

Syn. B.P.—Caustic Potash, Potassium Hydrate, Hydrate of Potassium B. P. 1885.

Source—Prepared by the interaction of potassium carbonate and calcium hydroxide. $K_2CO_3 + Ca2HO = 2KHO + CaCO_3$.

Characters.—Deliquescent, corrosive, alkaline, white pencils or cakes. *Solubility.*—2 in 1 of water and 1 in 2 of alcohol (90 p. c.) *Impurities.*—Lead, copper, arsenium chloride. Should not contain more than 10 p. c. of combined water and impurities.

Action.—Powerful caustic.

Enters into.—The preparation of Pot. Bromid., Pot. Iodid., Pot. Permanganas, and the

OFFICIAL PREPARATION.

1. **Liquor Potassæ.**—27 grs. Caustic Potash in 1 oz. A colorless, odorless, transparent, alkaline liquid, with sp. gr. 1·058. *Impurities.*—Carbonates, sulphates, chlorides and other metals.

Dispensing hint.—To be kept in green glass bottles with air-tight stoppers.

Action.—Antacid. **B.P. Dose.**—10 to 30 ms., well diluted.

NON-OFFICIAL PREPARATIONS.

1. **Potassa Cum Calce.** *Syn.—Vienna Paste.*—Caustic potash and quick lime of equal weights. Also sold in moulds and cylinders.

PHARMACOLOGY.

Externally.—Caustic potash or a concentrated solution of potash has a strong affinity for water, and dissolves albumen. It therefore rapidly destroys tissues with which it comes in contact, producing a greyish eschar. Hence, it is a powerful **irritant** and **caustic**. A less concentrated solution is irritant, softening and dissolving the epidermis. Still more diluted, it (1) reddens the skin, (2) neutralises acids, and (3) dissolves greasy snbstances. It is therefore a **rubefacient, antacid** and **detergent.** A *hot weak* solution is a **sedative.**

Internally.—Liquor potassæ acts in the same way as the potassium carbonates, but it has more irritant and less diuretic action.

THERAPEUTICS.

Externally.—Caustic potash is now rarely used to make openings into deep seated **abscesses** or **cysts**, such as liver abscess, but occasionally the solid stick is applied to destroy **lupus** and **epithelial cancers**. As it diffuses rapidly, care should be taken to protect the surrounding and deeper tissues, by applying blotting paper to absorb the moisture, or coverieg the part with two or three pieces of plaster, and applying the caustic through a hole in the centre. The hole should be *smaller* than the eschar which it is intended to produce Acetic acid or vinegar diluted, should be applied to neutralise the caustic when further action is no longer required. The severity of its action can be better controlled by the use of *Vienna paste*, which is more manageable than the undiluted caustic potash. Poisonous wounds, foul, unhealthy or corroding ulcers can be similarly treated and so made to take on healthy action.

A pellet of cotton wool soaked in liquor potassæ firmly applied over an ingrowing toe nail, so far softens it as to admit of its being easily scraped or peeled off without pain Weaker lotions are used to partially dissolve and facilitate the removal of scales in **psoriasis**, and to allay the **itching** of **urticaria** and **eczema**. A weak hot lotion may be employed locally as a fomentation or bath to relieve the pains of **gout** and **rheumatism.** Soft or potash soaps are good cleansing agents.

Internally.—As an antacid, it is occasionally serviceable in **irritative acid dyspepsia**, but as an alkaliniser of blood and urine, the bicarbonate, citrate and acetate are to be prefered, as they are less irritant to the stomach. It is given to **absorb fat** in **obesity**, but serious consequences may follow from excessive use of alkalies or their carbonates, as they cause derangement of digestion and lessen the total amount of the solids of the blood. They also undoubtedly increase the oxidation of both fats and proteids. You should therefore always advise your patents to avoid the various quack nostrums which are extensively advertised as cures for corpulence.

POTASSA SULPHURATA.

See Sulphur.

POTASSII ACETAS. Potassium Acetate.

$CH_3,COOK.$

Source.—Prepared by fusing the product of the interaction of acetic acid and potassium carbonate. $K_2CO_3 + 2(CH_3COOH) = 2CH_3.COOK + H_2O + CO_2$.

Characters.—White foliaceous, satiny masses, or granular particles, deliquescent, alkaline. *Solubility.*—2 in 1 of water, 1 in 2 of alcohol (90 p. c.) *Impurities.*—Carbonates, sulphides and metallic impurities.

Action.—Diuretic and antilithic. **B.P. Dose.**—10 to 60 grs.

POTASSII CITRAS. Potassium Citrate.

$C_3H_4.OH. (COOK)_3.$

Source.—Prepared by the interaction of citric acid and potassium carbonate. $3K_2CO_3 + 2H_3C_6H_5O_7 = 2K_3C_6H_5O_7 + 3H_2O + 3CO_2$.

Characters.—White, deliquescent powder. Taste saline, feebly acid *Solubility.*—Freely in water.

Action.—Antacid, diaphoretic and diuretic. **B.P. Dose.**—10 to 40 grs.

POTASSII TARTRAS. Potassium Tartrate.

$(CHOH)_2(COOK)_2, H_2O.$

Source.—Prepared by neutralising acid potassium tartrate with potassium carbonate. $2KHC_4H_4O_6 + K_2CO_3 = 2K_2C_4H_4O_6 + H_2O + CO_2$.

Characters.—Small, colorless, 4 or 6 sided prisms. Neutral in reaction. *Solubility.*—1 in 1 of water. *Impurities.*—Acid tartrate, metals.

Action.—Diuretic, cathartic. **B.P. Dose.**—20 to 60 grs., as a diuretic ; 2 to 4 drs. as a purgative.

POTASSII TARTRAS ACIDUS. Acid Potassium Tartrate.

$(CHOH)_2, COOH.COOK.$

Syn. B.P.—Bitartrate of Potassium, Purified Cream of Tartar.

Source.—Prepared from the crude cream of tartar which is deposited during the fermentation of grape juice and from the lees of wine.

Characters.—A gritty white powder, or fragments of crystallised cakes. Taste acid. *Solubility.*—1 in 200 of cold water, not in alcohol. *Impurities.*—Sulphates, chlorides and metals.

Action.—Diuretic, saline purgative. **B.P. Dose.**—20 to 60 grs. as a diuretic ; ¼ to ½ oz. as a purgative.

Enters into.—The preparation of Acid Tartaric, Ferrum Tart., Antim. Tart., Sod. Tart., Pot. Tart., Conf. Sulph., Troch. Sulph., Pulv. Jalap. Co.

NON-OFFICIAL PREPARATION.

1. **Imperial Drink.** *Syn.—Potus Imperialis.*—Acid Pot. Tartrate 1 dr., Glusidum 1 gr., Ol. Limonis 3 ms., Boiling Water to 1 pint ; or Acid Tartrate 1 to 1½ drs., Sugar *q.s.*, boiling water to 1 pint, in which half the fresh peel of a lemon has been infused.

PHARMACOLOGY OF POTASSIUM ACETATE, CITRATE, TARTRATE AND ACID TARTRATE.

Externally.—All these salts are neutral, except the acid tartrate which is acid. They have none of the antacid or caustic properties of liquor potassæ or alkaline potassium salts.

Internally. **Gastro-intestinal tract.**—These salts are not irritant to the stomach and are therefore easily bourne. Being neutral (one freely acid), they are **not antacid** like the alkaline potash salts. In large doses (¼ to ½ oz.) they are purgatives. The tartrate and acid tartrate are typical saline hydragogue purgatives. They produce easy liquid motions without griping. They act by stimulating the secretion of succus entericus, and hindering its reabsorption (See page 129.). A portion may possibly be converted into carbonate in the intestine and absorbed as such, but the greater portion is excreted with the fæces. A little of that which is absorbed may be re-excreted into the bowels, thus acting as a **remote purgative**.

Blood.—All potash salts made from vegetable acids are converted into carbonates after absorption into the blood, thereby increasing its alkalinity They are therefore **indirect alkalinisers** of blood. The alkalinity is not affected if the salt is acid, such as acid tartrate Reaching various tissues of the body containing potassium salts, they supply their wants, and thus act in a manner as **restoratives**

Kidneys.—All these salts in moderate doses are **diuretics**, especially the acetate : the tartrate and acid tartrate acting only in a modified degree. They are direct stimulants to the renal cells. They are speedily eliminated as carbonates, and in their passage through the kidney, render the urine alkaline. They are therefore powerful and rapid **alkalinisers of acid urine**. Although the urine becomes alkaline, yet the total amount of acids eliminated is increased. They have a very slight effect on the flow in health.

Skin.—All of them are mild diaphoretics, and are said to act by dilating the cutaneous capillaries, but the method of their action is obscure. Of all these salts, the citrate is considered to be the most reliable diaphoretic.

°**Note.**—These salts act either as diuretics or diaphoretics indiscriminately. If you wish the former effect, you must keep the patient cool; if the latter, wrap him up in blankets and administer warm drinks as adjuvants.

THERAPEUTICS OF POTASSIUM ACETATE, CITRATE, TARTRATE AND ACID TARTRATE.

Internally. **Gastro-intestinal tract.**—The nascent citrate and tartrate are powerful gastric sedatives, and are therefore prescribed for **gastric irritability**. For this purpose, the carbonate or bicarbonate is given with lemon juice, citric acid and tartaric acid in an effervescing form (see page 185). The tartrate and acid tartrate are used only as saline hydragogue purgatives in **constipation, piles, dysentery,** or for the abstraction of fluid in **dropsy, uræmia, ascites, pleuritic effusion,** &c. For this object they should be given in a concentrated form. Their twofold action on the bowels and kidneys renders them peculiarly serviceable in this class of cases. Pulv. Jalap. Co., or the acid tartrate in lemonade can thus be given as a hydragogue.

Blood.—These salts were formerly largely given in **acute rheumatism,** because they rendered the blood alkaline, but since the salicylates have come into use they are rarely prescribed for this purpose. In **gout,** both the direct and indirect alkaline potash salts are used, with the object of not only holding in solution the excess of uric acid circulating in the blood, but of affecting the "chemistry of the tissues, causing an increased oxidation, and thereby preventing to some extent the formation of uric acid." The citrate of potash has been recommended in **scurvy,** but it cannot replace fresh lemon juice or fresh vegetables.

Kidneys.—These salts are eminently successful in **alkalinising acid urine.** When we want to maintain its alkalinity for a long period, the citrate is to be selected, as it does not derange the stomach. Thus they not only prevent the precipitation of uric acid, in cases of **uric acid diathesis,** but actually dissolve small **uric acid calculi** in the kidneys or bladder. Sir W. Roberts warns us against using more than 40 to 60 grs. of acetate or citrate in 4 ozs. of water, every 4 hours, for he says that in larger doses they may cause a formation of insoluble biurate on the surface of the stones. To **increase diuresis** the citrate and acetate are chiefly employed. The saline diuretics are largely given in **febrile conditions, Bright's disease, and renal dropsy** and occasionally in **cardiac dropsy,** on account of their depressing influence on the circulation. For this purpose they are combined with digitalis or scoparium.

Skin.—Occasionally the citrate and acetate are given in fevers to produce diaphoresis. The imperial drink is a pleasant refreshing beverage which is much appreciated by fever patients.

Lungs.—Because these salts are converted into carbonates in the blood, the citrate and acetate are sometimes given as expectorants in **bronchitis** with **viscid secretion.**

POTASSII BICARBONAS. Potassium Bicarbonate.

$KHCO_3$.

Syn. B.P.--Potassium Hydrogen Carbonate.

Source.—Obtained by saturating a strong aqueous solution of potassium carbonate with carbonic anhydride, $K_2CO_3 + CO_2 + H_2O = 2KHCO_2$.

Characters.—Colorless, non-deliquescent, non-corrosive, monoclinic prisms. Taste feebly alkaline. *Solubility.*—1 in 4 of water. *Impurities.*—The same as of carbonate.

Action.—Antacid, sedative, antilithic, diuretic.

B.P. Dose.—5 to 30 grs. in solution.

N. B. 20 parts by weight are neutralised by 14 parts of citric and 15 of tartaric acid, whilst the carbonate requires 17 and 18 respectively.

POTASSII CARBONAS. Potassium Carbonate.

K_2CO_3, H_2O or $K_2CO_3, 2H_2O$.

Syn. B.P.—Salt of Tartar

Source.—Obtained from the ashes of wood, or by interaction of crude potassium sulphate and crude calcium carbonate and carbon.

Characters.—White. deliquescent, crystalline powder. Taste alkaline, caustic. *Solubility.*—1 in 1 of water. *Impurities.*—Sulphates, chlorides, metals.

Action.—The same as of bicarbonate. **B.P. Dose.**—5 to 20 grs.

Enters into.—The preparation of Decoct. Aloes Co., Liq. Arsen., Pot. Caustic., Mist. Ferri Co., Pot. sulphurat., Pot. Acetas, Pot. Bicarb., Pot. Citras, and Pot. Tartras.

PHARMACOLOGY OF POTASSIUM CARBONATE AND POTASSIUM BICARBONATE.

Externally.—A solution of these salts has actions somewhat resembling those of liquor potassæ. The carbonate is more irritant and corrosive than the bicarbonate, but less so than caustic potash or liquor potassæ. The carbonate is seldom used.

Internally. **Gastro-intestinal tract.**—The bicarbonate possesses all the properties of potassium salts, without any local irritative effects, and is therefore usually prescribed. Like other alkalies, it momentarily **checks the secretion of alkaline saliva** in the mouth. Reaching the stomach, like the other alkalies, it performs three specific functions, *viz.*—(1) Given before a meal, it **stimulates** the secretion of the **gastric juice,** which continues to flow even after the alkali has been neutralised. (2) Taken after a meal, it neutralises the excessive **acidity** of the contents of the stomach as well as the gastric juice already secreted ; hence it is an **antacid**. (3) It is a **sedative** to the gastric nerves. Very large single doses cause vomiting. Repeated large doses open the bowels, but paralyse their muscular coats.

Blood.—Both these salts are freely absorbed and rapidly excreted, the bicarbonate being converted into carbonate. They temporarily increase the alkalinity of the blood. In anæmic conditions, they raise the hæmoglobin value and the corpuscular richness, especially if combined with iron. If given for any length of time, they cause the quality of the blood to deteriorate and reduce the body weight.

Heart and circulation—Small doses of potash salts have no influence on the heart. Large doses decidedly **depress the cardiac force**, and toxic doses arrest it in diastole, by directly affecting the cardiac muscles. This effect is most marked if the salt is directly introduced into the veins, when, after a transitory excitement, cronic spasms, paralysis and death occur. With large doses, the blood-pressure and pulse-rate fall considerably.

Respiratory tract—Potash salts stimulate the bronchial secretion, and make the mucus less viscid. They are therefore **expectorants**. Potassium iodide possesses this property in a very marked degree.

Kidneys, &c.—Both the bicarbonate and carbonate, as well as the vegetable potash salts, are eliminated as carbonates, and in this way, they stimulate the secretion of urine, and are therefore **diuretics**. They also **alkalinise** the urine and thereby increase its capacity of holding more **uric acid in solution.** Passing over the mucous membrane of the genito-urinary tract, they either exercise a direct sedative action on it ; or by rendering the urine alkaline soothe any irritation that may be present.

Nervous system and muscles.—They are direct **depressants** to the **brain, spinal cord** and **muscles,** hence they must be used with caution. These salts when locally applied in minute doses cause the muscles to contract, but if the application is continued for any length of time, or in larger doses, they paralyse them. They abolish the prolonged contraction produced by veratrine or barium salts.

Toxic action.—Poisoning by caustic potash is rare. The symptoms are similar to those produced by caustic soda (*q. v.*).

THERAPEUTICS OF POTASSIUM BICARBONATE AND CARBONATE.

Externally.—These salts can be given in the same class of cases where liquor potassæ is used. A solution of potassium carbonate (1 dr. to 1 pint) allays the troublesome **itching** of many skin diseases, such as **urticaria**, **lichen**, &c. and as an injection, arrests the discharge in **leucorrhœa.** A weaker solution ($\frac{1}{3}$ dr. or less, in 1 pint) checks the weeping of raw, red **eczema.** For this purpose a piece of lint soaked in the lotion is applied to the raw surface and then covered with oiled silk to check evaporation.

Internally.—The bicarbonates are always used in preference to the carbonates and sodium salts in preference to those of potassium. In **dyspepsia**, where the gastric secretion is deficient, the bicarbonate can be given a few minutes before food; and where there is epigastric pain, heart-burn or acid eructations, it is best administered after food. In **gastric irritability**, or to render the **blood and urine alkaline**, it is best given in effervescing form (30 grs. in 1 pint). Thus, it is beneficial in **gout**, as it holds more uric acid in solution. Formerly it was largely prescribed for **rheumatism.** The writer has at times found good results in **chronic rheumatism**, and **rheumatoid arthritis**, by combining it with potassium iodide As an **antidote** to poisoning by caustic acids, the carbonate or bicarbonate is to be avoided for it creates carbonic acid gas and so causes risk of rupture of the stomach. Liquor potassæ and other alkaline salts can be used instead. The bicarbonate is used in **bronchitis** to lessen the viscidity of the expectoration, but large doses cause anæmia of the mucous membrane, and diminish the secretion to a dangerous extent.

Caution.—For the reasons already mentioned potassium salts should not be continued too long.

POTASSII BICHROMAS. Potassium Bichromate.

K_2CrO_4, CrO_3

Syn. B.P.—Potassium Dichromate, Red Chromate of Potassium.

Source.—Obtained by roasting chrome ironstone with lime in the presence of air, and by treating the resulting chromate with a potassium salt, and subsequently with an acid.

Characters.—Large, orange-red, transparent, triclinic crystals; fuses below redness. *Solubility.*—1 in 10 of water.

Enters into.—The preparation of Chromic Acid. **B.P. Dose.**—$\frac{1}{10}$ to $\frac{1}{6}$ gr. in capsule or pill with Kaolin.

ACTIONS AND USES.

Potassium bichromate is rarely used in medicine, but extensively in arts. In large doses, it causes severe **gastro-enteritis** with collapse. Those that handle this salt, suffer from **eczema.** Dr. Fraser recommends it in **dyspepsia** and **gastric ulcer.** It is best given in pill form on an empty stomach.

Toxic action.—It is a powerful irritant poison.

Antidotes.—Emetics or pump. Albuminous and demulcent drinks, magnesium carbonate, chalk, &c.

POTASSII BROMIDUM.

See page 278.

POTASSII CHLORAS. Potassium Chlorate.

$KClO_3$.

Source.—Obtained by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with potassium chloride and subsequently crystallising.

Characters.—Colorless, monoclinic crystals. Taste cool, saline. *Solubility.*—1 in 16 of cold, 1 in 3 of boiling water.

Incompatibles.—Explodes when rubbed with sulphur, sulphides, charcoal, sugar, tannic acid, ammonium chloride or glycerin. Mineral acids, ferrous salts.

Action.—Local stimulant and antiseptic.

B.P. Dose.—5 to 15 grs. in solution or tablets.

Enters into.—The preparation of Pot. Permanganas and the

OFFICIAL PREPARATION.

1. **Trochiscus Potassii Chloratis.**—3 grs. in each, white. *Dose*—1 to 6.

NON-OFFICIAL PREPARATIONS.

1. **Gargarisma Chlori.**—Pulv. Pot. Chlorat. 1 dr., Acid Hydrochlor. 16 ms., Distilled Water 8 ozs. Generate chlorine gas by mixing chlorate and acid, and dissolve it gradually in water. ½ oz. glycerin may be added.
2. **Voice Tablets.**—**Tablets of Potassium Chlorate,** 5 grs. each. **Tablets of Potassium Chlorate and Borax,** 5 grs. each. Tablets of **Potassium chlorate, Borax and Cocaine Hyd.** 5 grs. each.

PHARMACOLOGY.

The actions of potassium chlorate are not identical with those of other potassium salts.

Externally.—Coming in contact with a septic surface, or discharge, it is decomposed, and oxygen is liberated. This nascent oxygen then acts as a **stimulant** and **antiseptic** to **living tissues**, but it is not an antiseptic in the ordinary sense of the term, as outside the body it has very little effect, even upon the most sensitive bacteria.

Internally. **Gastro-intestinal tract and liver.**—In small doses, potassium chlorate has no action, but in large doses, it causes *gastro-intestinal irritation* with vomiting and purging.

Heart and circulation.—Small doses have no action on the heart, but large doses **depress** it, sometimes even causing death. A small portion is converted into a chloride in the blood, and the rest is excreted unchanged with the urine and other secretions. According to Binz the salt is reduced in the blood stream and thus free oxygen is given off to the tissues, but Coghill considers that its mere presence in the blood is enough to oxygenate it. Whatever may be the exact truth, it is a fact that it has some alterative and stimulating influence on the unhealthy mucous surfaces and on the functions of the secreting structures. In very large doses, it disintegrates the red blood corpuscles, and **converts hæmoglobin** into **methæmoglobin**, thus turning the red blood brown, and making the skin cyanotic. If the blood of a patient poisoned by potassium chlorate be shaken up with air or oxygen it does not regain its arterial color (distinction from ordinary cyanosis). These changes in the blood are accelerated by.—

(1). Addition of large quantity of sodium carbonate.
(2). Warmth.
(3). Carbonic acid and the acid phosphates.
(4). Diminished alkalinity of the blood.

These facts should be carefully remembered as they have an important bearing on the question of the treatment of disease by means of the large doses of the drug.

Kidneys.—In moderate doses (15 to 20 grs.) it acts as a diuretic, and more powerfully during pregnancy. In toxic doses, the kidneys become congested, the urine becomes bloody or dark-colored, and at last there is complete suppression. Death occurs usually from uræmia.

Secretions.—It influences peculiarly the salivary, buccal and mammary secretions, which increase if deficient and decrease if excessive. The bronchial secretion is also increased.

Toxic action.—It is no longer reckoned as an inert substance, for poisoning has occured in doses not considered toxic, though given freely. Cyanotic appearance, vomiting, purging, hæmaturia, suppression of urine, dyspnœa and cardiac weakness, are some of the chief symptoms. 7 drs. have caused death.

As it formerly happened that, in many cases of poisoning from potassium chlorate, the symptoms were erroneously attributed to diphtheria, so on the other hand, in fatal cases of diphtheria which have been treated by the chlorate, the symptoms may very easily be mistaken for those of poisoning from the chlorate. When such cases form the subject of legal enquiry, great care and caution are necessary in forming an opinion upon them.

THERAPEUTICS.

Externally.—Potassium chlorate is never used for washing **ulcers, wounds, sinuses** or **suppurative cavities**, though a lotion (5–6 grs. to 1 oz) can be usefully employed for this purpose.

Internally.—Its chief local use is in the treatment of many mouth and throat diseases, such as **aphthous, ulcerative and gangrenous stomatitis, follicular tonsillitis,** and **follicular pharyngitis.** A lotion (10—15 grs. to 1 oz. of water, or any astringent infusion) is an excellent gargle for such cases. Tablets or lozenges may be slowly sucked. The powdered salt locally applied to **spongy gums,** and **aphthous spots** on the gums, cheek and tongue, conduces to their rapid healing, and in case of small **epithelial cancers**, to diminution of pain and arrest of growth.

These catarrhal conditions of the mucous membrane of the mouth and fauces are greatly benefited if the local treatment is accompanied by internal administration, for the salt is excreted with the saliva after absorption, and thus locally influences the disease. Its efficacy is greatly increased if it is combined with borax, or in case of **hoarseness of voice**, with borax and cocaine. Certain blood diseases, such as **hæmorrhagic purpura, epistaxis, hæmaturia**, are said to improve under potassium chlorate (Hankin). It is now rarely used in **diphtheria**, though still occasionally employed in **croup** and acute and chronic **bronchitis**. As a supposed oxygenating agent, some yet prescribe it for **low fever** and **blood poisoning**. The writer considers this drug to be a valuable diuretic in the **suppression of urine in cholera**.

Prescribing hints.—In order to avoid misadventure, the following points must be carefully borne in mind.—(1) Pot. chloras must be *given cautiously* when the *temperature is high*, or when the *breathing or circulation is embarrassed*, for in fever the alkalinity of the blood is lessened, and if there is dyspnœa, the tension of the carbonic acid in the blood is raised. (2) *Never give a large dose on an empty stomach*, as it will then be absorbed too rapidly. (3) *Withhold it altogether in disease of the kidney*, as, owing to the diminished excretion of urine, it may readily accumulate to an undesirable extent. (4) *When the patient is unable to take food*, the use of the remedy should be limited to painting the fauces with a solution which should not be stronger than 5 p c (5) When giving the remedy in larger doses avoid the *simultaneous use both of free acids and mineral waters rich in carbonic acid.* (6) The *total amount given in 24 hours* should not exceed :—

(*a*) For an infant....................20 grs.
(*b*). For a child........................30 grs.
(*c*). For an adult.......................90 grs.

POTASSII IODIDUM.

See page 453.

POTASSII NITRAS. Potassium Nitrate.

KNO_3.

Syn. B.P.—Nitre, saltpetre. **Syn. I.V.**—*Sorá*, Beng. *Shorá*, Hind.

Source.—May be obtained by purifying crude nitre, or by the interaction of sodium nitrate and potassium chloride. The crude nitre is chiefly found in the surface soil of India.

Characters.—White crystalline or striated, 6-sided, colorless prisms. Taste cool, saline. *Solubility.*—1 in 4 of cold, 2 in 1 of boiling water. *Impurities.*—Chlorides, sulphates, lime.

Action.—Diuretic, diaphoretic. **B.P. Dose.**—5 to 20 grs. in solution.

Enters into.—The preparation of Argenti Nitras Induratus and Argenti Nitras Mitigatus.

NON-OFFICIAL PREPARATIONS.

1. **Nitrated Papers.** *Syn.—Ozone Papers.*—Are made of 3 strengths by saturating white blotting paper in a solution in nitre of the strength of 30,45 and 60 grs. to the ounce. The fumes are inhaled in asthma.

2. **Charta Nitrata et Chlorata.**—Soak blotting paper in a concentrated solution of nitre and potassium chlorate and dry. In asthma. (Suggested by Ringer. The whole room should be filled with the fumes)

3. **Pulv. Lobeliæ Comp.**—Potassium Nitrate 240, Boiling Distilled Water 240, dissolve and soak a mixture of Lobelia, Stramonium leaves and Black Tea in powder of each 240. Mix well, dry, and add oil of anise 1. One tea-spoonful may be burnt to fumigate a bed-room, or the fumes inhaled in asthma. This is a supposed imitation of **Himrod's, Bliss's** and **Green Mountain Cures.**

PHARMACOLOGY.

Externally.—Potassium nitrate is slowly absorbed by the unbroken skin, and produces a local **refrigerant** action, by reducing the circulation of the part.

Internally. **Gastro-intestinal tract.**—Being very diffusible, it is very readily absorbed, and quickly thrown out **unchanged.** Large doses cause **gastro-enteritis** and even death from excessive vomiting and purging. Buchheim considers that these effects are entirely due to diffusion.

Heart and blood—Of all the potash salts, it is the most **powerful depressant** to the heart, rendering its action slower and weaker. It destroys the normal oxygenating powers of the red-blood corpuscles, and in large doses lowers the **coagulability** of the blood. The depression of the heart is due to (1) reflex irritation starting from the viscera, (2) admission of an abnormal amount of potassium into the blood through the relaxed vessels, (3) possibly a partial reduction of the nitrate to the *poisonous nitrite.*

Skin and kidneys.—It is slightly **diaphoretic.** Its action on the kidneys is similar to that of the potassium chlorate, but more **powerful.** It is passed with the urine **unchanged.**

THERAPEUTICS.

Externally.—A concentrated solution of nitre with or without indigo blue is frequently applied by Indian mothers to the abdomen of infants to relieve tympanitis or to produce diuresis.

Internally.—Now a days its use is almost discarded. The tablets can be slowly sucked in **relaxed sore throat.** Formerly it was employed in almost every **febrile and inflammatory** disease, but now only on rare occasions. The writer at times observed very good effects in **acute pleurisy** of a sthenic type He gives it with antimonial wine. It is no longer used in **rheumatism**, but it is a capital remedy for arresting the onset of a **gouty attack**, or for removing the headache due to a debauch. 20 grs. of nitre with 30 grs. of potassium bicarbonate in a tumbler of soda water is the best method of administering in such cases. In inflammatory conditions of the **trachea** and **bronchi**, it is still considered a reliable antiphlogistic and expectorant. As an inhalation if cuts short an **asthmatic fit** remarkably well, and hence it is the basis of many nostrums, such as Himrod's Cure, Green Mountain, &c. Charta nitrata or charta nitrata et chlorata can be burnt, and the fumes inhaled. As a diuretic, preference is given to potassium acetate and citrate.

Caution.—Its use is to be avoided in inflammation of the stomach, intestines, bladder and kidneys, and cardiac weakness.

POTASSII PERMANGANAS.

Potassium Permanganate. $K_2Mn_2O_8$.

Source.—May be prepared by the interaction of potassium chlorate, potassium hydroxide and manganese dioxide. $6KHO + KClO_3 + 3MnO_2 = 3K_2MnO_4 + KCl + 3H_2O$. The potassium manganate becomes permanganate by boiling thus—$3K_2MnO_4 + 2H_2O = K_2Mn_2O_8 + 4KHO + MnO_2$.

Characters.—Dark, purple, slender, prismatic, iridescent crystals; taste sweet, astringent. *Solubility.*—1 in 20 of cold water. *Impurities.*—Carbonates, chlorides, sulphates and dioxide of manganese.

Incompatibles.—Oxidisable substances, especially organic ones, and any reducing agent.

Action.—Antiseptic, deodorant, emmenagogue. **B.P. Dose.**—1 to 3 grs. with kaolin (see p. 86) or in solution.

Official Preparation.

1. **Liquor Potassii Permanganatis.**—1 gr. in 110 ms. Of a disagreeable taste. **Condy's fluid** is only of half the strength. **B.P. Dose.**—2 to 4 drs. in distilled water.

Non-Official allied Preparations.

1. **Calcium Permanganate.** *Syn.—Monol.*—Brown, deliquescent crystals; soluble in water. Sterilises water (1 in 100,000). Said to be useful in enteritis and diarrhœa of children. *Dose.*—1 to 2 grs.
2. **Sodium Permanganate.**—Green, soluble in water. A cheap antiseptic.
3. **Zinc Permanganate.**—Violet-brown, deliquescent, soluble in water. Powerful antiseptic and non-irritating; antigonorrhœic as an injection.

Pharmacology.

Externally.—Potassium permanganate ,in its solid form is an irritant and even caustic, and in solution a stimulant. Apart from its local actions on the human body, it is a valuable **oxidising agent**, giving off oxygen when moist and in the presence of organic matter, thus destroying decomposing ferments and septic germs. Therefore, it is an **antiseptic, deodorant** and **disinfectant**. The only draw-back is that the article is expensive and yields up oxygen too quickly, rendering it inert after a short time ; consequently its germicidal powers are limited.

Internally.—It is an unstable compound, being decomposed into manganese dioxide in the stomach, in which form it is probably absorbed. Manganese salts have **no hæmatinic** property as was once supposed ; in fact, nothing definite is known of their action on the blood and tissues. When injected into the blood, or subcutaneously, they are excreted by the intestine and kidneys. Ringer considers it a useful **emmenagogue**. He has not seen abortion follow its use, though others have done so.

THERAPEUTICS.

Externally.—For rapidly disinfecting stools and foul discharges, washing bed-pans, articles, and hands after contact with infectious diseases, for flushing water closets and drains, potassium permanganate in solution (1 in 150) is an excellent antiseptic and deodorant. Being odorless and non-irritant, it is best suited for use at the bedside. Fabrics are stained by it, but the stain is easily removed by sulphurous acid, but they must be immediately washed, otherwise they would be damaged by the sulphuric acid formed A weaker lotion (2 grs. to 10 ozs. of distilled water), can be used as a wash for **foul** or **suppurating ulcers, abscess,** or other **suppurating cavities,** as **empyema,** **sinuses, ozœna** ; or as an uterine or vaginal douche after **parturition** or **cancer of the os**. As an injection ($\frac{1}{2}$ gr. to 1 oz.) in **gonorrhœa** and (1 gr. to 1 oz.) in **gleet,** it has given good results. A lotion can be used with benefit(1 gr. to 2 ozs.) in **burns, scalds** and **frost bites**. A saturated solution (1 in 20) is an excellent application in **bites** by poisonous snakes and rabid dogs, if it can be immediately applied. A 15 p. c. solution can also be freely injected into the subcutaneous tissues for this purpose, but it must be noted that its contact with the virus is essential and therefore it is useless to try it some hours after the bite has been inflicted and when the virus has entered the circulation. It is largely employed in dyeing white hair to a chestnut brown.

Internally.—Potassium permanganate makes a very effective gargle (2 grs. to 10 ozs. or the official solution diluted to 1 in 50) in **foul** and **ulcerative** diseases of the gums, mouth and throat, such as **ulcerative** and **gangrenous stomatitis**. On account of its powerful oxidising property, it is the best **antidote** for opium and morphine poisoning, if it can be given soon after the swallowing of the poison (see p. 510). It is also a successful antidote to phosphorus poisoning. As an emmenagogue it is strongly recommended in **delayed, deficient** or **arrested menstruation**, but the writer has not found much benefit from its use. It is no longer used in **diabetes, infective fevers** or **anæmia.** It can be given in pill or solution. There is a danger of ulceration being caused by the tablets. Liqr. Pot. Permanganatis is disagreeable to swallow.

POTASSII SULPHAS. Potassium Sulphate.

K_2SO_4.

Source.—May be obtained by purifying the crude salt, or by the interaction of sulphuric acid and potassium chloride or some other potassium salts.

Characters.—Colorless, hard, rhombic prisms, terminated by 6 sided pyramids. *Solubility.*—1 in 10 of cold and 1 in 4 of boiling water. *Impurities.*—Chlorides, nitrates and other metals.

Action.—A mild cathartic. **B.P. Dose.**—10 to 40 grs.

Enters into.—Pil. Colocynth. Co., Pulv. Ipecac Co. and their preparations,—Pil. Colocynth et Hyos. and Pil. Ipecac c. Scilla.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is a mild **saline purgative**, acting by stimulating the glandular secretion of the intestine, and is a **hepatic stimulant.** In pharmacy, it is chiefly used to help the pulverization of tough substances, as ipecacuanha root. Therapeutically it is rarely used.

ADDITIONAL PREPARATIONS OF POTASSIUM.

1. **Potassii Auro-Cyanidum.**—White soluble crystals. Prevents the growth of anthrax bacilli when injected into the blood.
2. **Potassii Benzoas.**—See page 269.
3. **Potassii Cantharidas.**—See page 307.
4. **Potassii Cobalto-nitris.**—Yellow crystals, slightly soluble. Causes less discomfort than other nitrites. In uræmic dyspnœa and asthma. *Dose.*—$\frac{1}{2}$ gr.
5. **Pot. Glycerophosphis** (Merck).—50 p. c. solution. Soluble in water. Nervine tonic. In neurasthenia, phosphaturia. *Dose.*—3 to 4 grs. in water containing sodium chloride hypodermically.
6. **Potassii Hypophosphis.**—Explodes when triturated or heated with nitrate, chlorate or other oxidiser. Alterative. *Dose.*—1 to 6 grs.
7. **Potassium Osmate.**—Reddish crystalline powder, soluble in water. With bromides in epilepsy, and hypodermically in sciatica and other neuralgias. *Dose.*—$\frac{1}{10}$ gr. per day.
8. **Potassii Phosphas.**—A deliquescent, granular powder. Alterative in phthisis, rheumatism, &c. *Dose.*—1 to 10 grs.
9. **Potassii Salicylas.**—See page 195.
10. **Potassii Succinas.**—A deliquescent powder. Hæmostatic. *Dose.*—5 to 10 grs.
11. **Potassii Telluras.**—White, crystalline, soluble. Reduces or arrests night and day sweats of phthisis. Communicates a garlic odor to the breath. *Dose.*—$\frac{1}{3}$ gr. in pill daily.

PRUNI VIRGINIANÆ CORTEX.

Virginian Prune Bark. N. O. *Rosaceæ.*

Syn.—Wild Cherry Bark.

Habitat.—North America.

Source.—The bark of *Prunus serotina*, collected in autumn.

Characters.—Curved pieces or irregular fragments, $\frac{1}{16}$ in. thick. Young bark smooth, reddish-brown, marked with transversely elongated lenticels, and granular fracture. Old bark rough and nut-brown. Taste astringent, aromatic, bitter. Odor, after maceration with water, like bitter almonds.

Composition.—(1) *Amygdalin*, (2) *Emulsin*, which yields hydrocyanic acid in the presence of water. (3) *Volatile oil*, &c.

Action.—Nervine sedative and a flavoring agent.

OFFICIAL PREPARATIONS.

1. **Syrup. Pruni Virginianæ.**—3 in 20. **B.P. Dose.**—½ to 1 dr.
2. **Tinctura Pruni Virginianæ.**—1 in 5 **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY.

Internally.—The Virginian prune bark possesses very mild **stomachic** and **tonic** virtues, which are greatly antagonised by the tannin it contains. Its liquid preparations are **sedative**, because minute quantities of hydrocyanic acid are formed during the process of preparation.

THERAPEUTICS.

Internally.—Because both the syrup and the tincture contain essential oil, they are used as **flavoring** agents. The syrup is largely employed as a sweetening and flavoring agent in cough mixtures, but it can alone allay **cough** in tea-spoonful doses, on account of its sedative virtues. The tincture is recommended in **dyspepsia, chronic bronchitis, fatty heart, palpitation, mitral regurgitation, &c.**

PRUNUM. Prunes. N. O. *Rosaceæ.*

Habitat.—South of France.

Source.—The dried ripe fruits of *Prunus domestica.*

Characters.—Ovoid or oblong, 1¼ in. long, black, shrivelled; pulp brownish, without marked odor; Taste sweet, bland, acidulous.

Composition.—(1) *Sugar.* (2) *Malic acid.* (3) a purgative principle.

Action.—A gentle aperient. **Enters into.**—Conf. Sennæ.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Prunes are slightly **laxative, demulcent** and **nutritive**, and are therefore largely consumed as an article of food, especially by those who suffer from habitual constipation. When stewed they make a tempting dish for constipated children.

PTEROCARPI LIGNUM.

Red Sanders-Wood. N. O. *Leguminosæ.*

Syn. B.P.—Red Sandal Wood. **Syn. I.V.**—*Raktachandan*, Beng. *Lal Chandan*, Hind.

Habitat.—Southern India and Ceylon.

Source.—The heart-wood of *Pterocarpus santalinus.*

Characters.—Large heavy logs ; dark reddish-brown externally ; deep blood-red internally ; taste slightly astringent ; odor faintly aromatic.

Resembles.—Logwood which is less dense and more astringent.

Composition.—(1) *Santalic acid* or *Santalin.* (2) a *resinoid principle*, blood red.

Use.

It is only used to color compound tincture of lavender.

PYRETHRI RADIX. Pyrethrum Root.

N.O. *Compositæ.*

Syn.—Pellitory root. **Syn. I.V.**—*Akarkara* Beng. Hind.

Habitat.—Algeria, Levant.

Source.—The dried root of *Anacyclus pyrethrum.*

Characters.—Unbranched pieces, 2 to 4 in. long, ½ in. or more thick, cylindrical, or tapering towards both extremities ; the crown bearing a tuft of colorless hairs. Brown externally, and wrinkled longitudinally. Fracture short. Odor characteristic. Taste pungent, excites a copious flow of saliva when chewed. Easily recognised by the pricking sensation when chewed.

Resembles.—*Taraxacum* which is darker and has a bitter taste only.

Composition.—(1) *Volatile oils.* (2) *Resins.* (3) *Inulin*, a white powder resembling starch.

Action.—Powerful sialagogue.

OFFICIAL PREPARATION.

1. **Tinctura Pyrethri.**—1 in 5. Dark sherry colored.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Pellitory root when chewed produces a burning sensation, soon followed by tingling, numbness, and copious secretion of saliva, from the stimulation of the nerves and blood vessels, and those of the salivary glands. After a while the nerves are depressed. It is therefore a **powerful sialagogue**, and a slight **anæsthetic**. On account of these properties, it is used to relieve **toothache, relaxed uvula** and **sorethroat**. It is also serviceable in **paralysis of the tongue** for it stimulates its nerves. The tincture can be put within a carious tooth, and can be used as a **gargle** (1 dr. to 2 ozs.). Roth speaks well of it in **globus hystericus**.

PYROXYLINUM.

See page 415.

QUASSIÆ LIGNUM. Quassia Wood.

N. O. *Simarubaceæ.*

Habitat.—Jamaica.

Source.—The wood of the trunk and branches of *Picræna excelsa.*

Characters.—Logs exceeding 6 in. in diameter, yellowish-white, tough, dense, but easily split. Inodorous. Taste intensely bitter. Often seen in chips, or shavings.

Resembles.—Sassafras, which is aromatic and not bitter.

Composition.—(1) *Quassin*, a bitter principle. (2) A *volatile oil.* Contains no tannin.

Action.—A simple bitter.

OFFICIAL PREPARATIONS.

1. **Infusum Quassiæ.**—88 grs. to 1 pint., (¼ hour). **B.P. Dose.**—½ to 1 oz.
2. **Liquor Quassiæ Concentratus.**—1 in 10. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Quassiæ.**—1 in. 10. Straw colored. **B. P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION AND SUBSTITUTE.

1. **Quassin.**—A white crystalline neutral body slightly soluble in water. Stomachic, tonic. *Dose.*—$\frac{1}{30}$ to $\frac{1}{3}$ gr.
2. The wood of **Picrasma Quassioides** (*Charangi*, *Beng.*) is not so bitter as true quassia, though it contains the same bitter principle *quassin.* The bark and root being more bitter. It can be used as a substitute.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Quassia wood closely resembles calumba in actions and uses. It is a **pure bitter** without astringency, and acts as a poison to flies, fish, and worms infesting the rectum of human subjects. Being devoid of flavor, it is intensely bitter and is therefore not so agreeable to the stomach as gentian or chiretta. It can be given in the same class of cases where calumba or gentian is indicated, but being free from tannic acid, it can be combined with iron. A strong infusion makes an excellent **anthelmintic enema** in thread worms.

QUILLAIÆ CORTEX. Quillaia Bark.

N.O. *Rosaceæ.*

Syn. B.P.—Panama Bark.

Habitat.—Chili.

Source.—The inner part of the bark of *Quillaia saponaria.*

Characters.—Flat pieces $\frac{1}{6}$ in. thick, 2 ft. long, 4 in. wide. Outer surface brownish-white, or reddish-brown; inner surface smooth, white or yellowish-white. Taste astringent, acrid. Powder irritates nostrils.

Composition.—(1) *Sapotoxin* and (2) *Quillaic acid*, closely allied to Saponin. (See Senega root.)

Action.—Emulsifier and expectorant. **Enters into.**—The preparation of Liq. Picis Carbonis and the

OFFICIAL PREPARATION.

1. **Tinctura Quillaiæ.**—1 in 20. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The powdered soap bark is very irritant to the nostrils, giving rise to a nasal discharge, sneezing, and sometimes cough, and its inhalation is therefore recommended in acute and chronic catarrhal **rhinitis**. It is a local stimulant to **chronic ulcers**, and Shoemaker has been very successful in treating cases of this description by the application of bandages soaked in the infusion. He treats **pityriasis, dandruff, bromidrosis, hyperidrosis** in the same manner.

Internally.—Quillaia bark contains five times more *saponin* or senegin than senega, and is therefore a more powerful **expectorant**. It may be given in **chronic bronchitis**, and **emphysema** with deficient expectoration, but its use is contra-indicated in hæmoptysis, or ulceration of the throat and alimentary canal, on account of its irritant properties. Because it contains a large percentage of saponin, it is largely employed for **emulsifying** insoluble drugs : the only objection to its free use is that *sapotoxin*, which is an ingredient of saponin, is a dangerous blood poison, breaking up the blood corpuscles. It is said to be useful in **amenorrhœa**. The decoction may be used as a substitute for inf. senega.

QUININÆ HYDROCHLORIDUM.

See page 336.

RESINA. Resin. N. O. *Coniferæ.*

Syn.—Rosin.

Source.—The residue left after the distillation of the oil of turpentine from the crude oleo-resin (turpentine) of various species of *Pinus*.

Characters.—Translucent, light amber colored, compact, brittle, pulverisable ; fracture shining ; odor and taste terebinthinate. Burns with yellow flame and much smoke. *Solubility.*—Freely in alcohol (90 p. c.), ether, benzol, carbon bisulphide.

Composition.—The chief constituent is an organic acid, *Abietic acid*, which is converted into a soluble salt by alkalies.

Enters into.—The preparation of 8 plasters and the

OFFICIAL PREPARATIONS.

1. **Emplastrum Resinæ.** *Syn. B.P.—Adhesive Plaster.*—1 in 9½. A pale yellow solid.

2. **Unguentum Resinæ.** *Syn.—Basilicon Ointment.*—1 in 4 nearly. A yellowish-brown stiff ointment. Stimulant to indolent sores.

NON-OFFICIAL PREPARATION.

1. **Resinol.** *Syn.—Rosinol, Retinol.*—A non-saponifiable, non-irritant, yellowish, oily product of dry distillation of resin. Dissolves phosphorus, naphthol, camphor, creosote, cocaine, iodol, aristol, &c., and makes a good non-irritating stable basis for ointment. Powerfully **antiseptic** and **antipruritic**. Used in eczema, impetigo, scabies, hæmorrhoids. Internally, in rheumatism, bronchitis, gonorrhœa. *Dose.*—1 dr. in capsules.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Resin is **antiseptic** and mildly **stimulant**, and is therefore useful in indolent **ulcers, wounds,** and **sores.** Basilicon ointment is an excellent application for this purpose, but is apt to prove too stimulating if used for any length of time. Its chief use now is in pharmacy, to impart consistence and adhesiveness to plasters and ointments.

RHEI RADIX. Rhubarb Root.

N. O. *Polygonaceæ.*

Syn.—Turkey Rhubarb.

Habitat.—China and Thibet.

Source.—The erect rhizome or so-called root of *Rheum palmatum*, *Rheum officinale*, and other species, deprived more or less of its cortex and dried.

Characters.—In cylindrical, barrel-shaped, conical, plano-convex, or irregular pieces. The surface sometimes covered with a bright yellowish-brown powder. Rounded or angular, smooth, showing beneath dark red lines, intermixed with the reddish-brown substance of the root, usually presenting small, scattered, star-like marks. Frequently the pieces are bored with a hole which sometimes contains the remains of the cord used to suspend them while drying. The root is hard and compact, presenting a marbled, red and white appearance. Odor characteristic, aromatic. Taste slightly bitter, astringent, and gritty. *Impurities.*—English rhubarb, which has a different taste, odor, and an excess of starch. Turmeric, which becomes brown on addition of boric acid.

Composition.—(1) *Chrysarobin* is the chief, and is the coloring and purgative principle. (2) *Chrysophanic acid*, probably formed by the oxidation of chrysarobin. (3) *Rheo tannic acid.* (4) oxalate of lime (35 p. c.). (5) Other substances, as *emodin, phaolin*, rheumic acid, resin, starch, &c.

Action.—Stomachic tonic, astringent, purgative. **B.P. Dose.**—3 to 10 grs. for repeated use; 15 to 30 grs. for a single dose. 3 grs. for a child 1 year old.

OFFICIAL PREPARATIONS.

1. **Extractum Rhei.**—A brown dry extract. **B.P. Dose.**—2 to 8 grs.

2. **Infusum Rhei.**—1 in 20 (¼ hour). **B.P. Dose**—½ to 1 oz.

3. **Liquor Rhei Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

4. **Pilula Rhei Composita.**—1 in 4 (nearly). **B.P. Dose.**—4 to 8 grs.

5. **Pulvis Rhei Compositus.** *Syn.—Gregory's Powder.*—Pale yellow. Antacid, stomachic, purgative. **B.P. Dose.**—20 to 60 grs. in milk. 5 grs. for a child 1 year old.

6. **Syrupus Rhei**—1 in 15. Brown, thick. **B.P. Dose.**—½ to 2 drs. ½ dr. for a child 1 year old. The B. P. formula is unsatisfactory. Squire says to make a fluid extract of rhubarb with alcohol (60 p.c.) (1 in 4) and evaporate 8 ozs. to 3 grs. Mix this and oil of coriander 5 ms., with sugar 24 ozs, and water to 40 ozs. by weight. Dissolve without heat and strain.

7. **Tinctura Rhei Composita.**—1 in 10. Dark-brown. **B. P. Dose.**—½ to 1 dr. for repeated use; 2 to 4 drs. for a single dose.

Non-Official Preparation.

1. **Elixir Rhei, B P.C.**—Rhubarb 5 ozs., Fennel 2 ozs. Macerated repeatedly with alcohol and water (1 in 3) *q. s.*; and to the resulting tincture, add Glycerin 3 ozs. and Sugar 4 ozs; the whole quantity being 30 ozs. *Dose.*—1 to 3 drs.

Pharmacology.

Externally.—The percentage of chrysarobin in rhubarb is not enough to produce any local action by direct application

Internally. **Alimentary canal and liver.**—Rhubarb tinges the saliva and increases its flow. In small doses (2 to 5 grs.), it stimulates the secretion of the gastric juice and the peristalsis of the stomach. It is therefore a **stomachic** and **tonic**. In the intestine, it performs two definite functions. (1) In large doses (20 to 30 grs.), it increases the secretion of the intestinal glands and the peristaltic movements, and thus acts as a mild **purgative.** Purging occurs within 4 to 8 hours, often accompanied by griping, and the stool is liquid and yellow, the color being derived from the excess of bile, and chrysarobin, the pigment and the purgative principle. (2) After opening the bowels, the rheo-tannic acid in the rhubarb constipates by arresting the glandular secretion of the intestine. This **astringent** action may also be produced by small doses of the drug; but it must be noted that the action of rheo-tannic acid is slower than that of chrysarobin.

Some of the ingredients of rhubarb are absorbed into the blood, and go to stimulate the secretion of bile, without affecting any of the biliary constituents. The flow of bile is not so copious as to cause purgation. Therefore, it is a mild **hepatic stimulant.**

Elimination.—Chrysarobin has been found in the milk, and largely in the urine, both of which are colored by it. It makes the milk bitter and purgative. Rheo-tannic acid is excreted by the bowels.

THERAPEUTICS.

Externally.—As chrysophanic acid is excreted in the perspiration, it may be given internally in **psoriasis**, but it is never done with this object.

Internally.—Rhubarb is largely employed in **infantile ailments**. It is an excellent remedy for the **dyspepsia** of children, especially when caused by a faulty diet It expels undigested food, and produces first a soothing and afterwards an astringent effect. Goodeve's Red mixture (see p 478) is largely employed for this purpose in this country. In fact, it is one of our everyday nursery remedies. Similarly, it is most effective in controlling **infantile diarrhœa**, produced by undigested food, or other irritating matter ; here we look for the after astringent effect. Gregory's powder, which may be administered in milk, is a very useful aperient in many **gastric and abdominal troubles** of childhood. Syrup. Rhei or Elixir Rhei may be used instead, as they are palatable and do not gripe. As a pure purgative, it cannot be prescribed alone, on account of its griping and after constipating properties, but combined with equal quantity of soda, or with other purgatives, as Pil Rhei. Co., it may be given for this purpose. A full dose of Gregory's powder often cuts short an attack of **mucous diarrhœa** or **dysentery**, if given at the onset. Many praise it in **piles**, and consider it more effective if slowly chewed.

RHŒADOS PETALA. Red-Poppy Petals.

N. O. *Papaveraceæ.*

Syn. I. V.—*Lal posta*, Beng. *Rakta-posta*, Sans.

Source—The fresh petals of *Papaver Rhœas*.

Characters.—Bright scarlet, transversely elliptical, about 2 in. broad. Odor characteristic and taste slightly bitter.

Composition.—(1) *Rhœadic* and *Papaveric acid*, said to be the coloring principles. A non-poisonous principle. (2) *Rhœadine*. No morphine.

OFFICIAL PREPARATION.

1 **Syrupus Rhœados.**—1 in 3½. **B.P. Dose.**—½ to 1 dr.

USES.

The syrup is sometimes used to allay cough in children, but the chief use of the petals is as a coloring agent.

RICINI OLEUM. Castor Oil.

N. O. *Euphorbiaceæ.*

Syn. I.V.—*Bheranda Tel*, Beng. *Arand Tel*, *Rendi Tel* Hind.

Habitat.—India, chiefly cultivated in Bengal, Madras, and Bombay.

Source.—The oil expressed from the seeds of *Ricinus communis.*

Characters.—Viscid, colorless or faintly yellow. Odor faint, taste bland at first, acrid and unpleasant afterwards. *Solubility.*—1 in 5 of alcohol (90 p. c.), entirely in absolute alcohol, ether and oil of turpentine. *Impurities.*—Oil of the inferior castor oil seeds, cotton seed oil, *Mohua oil* and other fixed oils.

There are several varieties of oil, but the oil expressed by Mitchel's process without heat, known as "cold-drawn," should be used for medicinal purposes.

Characters of the seeds.—Oval, compressed, shining, marbled with reddish-brown or blackish-brown spots or stripes. Kernel white, albuminous, enclosing a large dicotyledonous leaf.

Resembles.—Croton oil seeds (see page 364.)

Composition.—Chemistry is not yet complete. (1) *Glyceryl ricinoleate* ; (2) *Ricinine*, an alkaloid, not purgative. (3) *Ricinoleic acid*, believed to be the purgative principle. (4) *Ricin*, an albuminoid poisonous body to whose presence is attributed the fact that three seeds prove fatal to an adult man. (5) Palmitin, stearin, resin, &c.

Action.—Purgative. **B.P. Dose.**—1 to 8 drs. daily. 1 dr. for a child 1 year old.

Enters into.—Collod. Flex., Lint. Sinapis. Co., Pil. Hyd. Sub. Co. and the

OFFICIAL PREPARATION.

1. **Mistura Olei Ricini.**—3 drs. in 1 oz. B. P. has wisely dispensed with saponification. Is now emulsified. Purgative. **B.P. Dose.**—1 to 2 ozs. as a dranght.

NON-OFFICIAL PREPARATIONS.

1. **Capsules of Castor Oil**—30 or 60 ms. in each flexible capsule.
2. **Enema Olei Ricini.**—Castor oil 2 ozs. Mucilage of Starch to pint.

PHARMACOLOGY.

Externally.—Like almond oil and olive oil, it is **bland** and **unirritating**. Rubbed into the skin, or injected into a vein or the rectum, it purges It is said to **increase the secretion of milk** when applied to the breasts, but poultices of the leaves of the castor oil plant are more effectual.

Internally. **Gastro-intestinal tract.**—Its local action on the stomach is the same as on the skin, unless it is rancid, when it causes nausea, eructations and vomiting In the duodenum pancreatic juice decomposes it, setting free *ricinoleic acid*, believed to be its purgative principle. It gently stimulates intestinal glands and peristalsis, and is a painless, speedy, certain and fairly **mild purgative**, operating within 4 to 6 hours. The stools are two to four in number, soft or semiliquid, but not watery, the oil being expelled with the last ones and occasionally creating griping. A portion of the oil is no doubt absorbed and when excreted by the mammary gland it may cause purgation to suckling babies. Some patients get habituated to its use, and in others it sets up after constipation like rhubarb. It is therefore unsuitable in habitual constipation.

THERAPEUTICS.

Externally.—It may be used like olive or almond oil. A drop of castor oil let fall on the conjunctiva **allays irritation** caused by a **foreign body**. It is employed as a basis of many hair-oils and pomades. According to Ringer, a daily application of castor oil removes **warts** within 4 to 6 weeks. It has been found sometimes to allay pain, and remove the stiffness of chronic articular rheumatism.

Internally.--It is the safest and **best purgative** for **children**, the **old** and **infirm**, **delicate females**, **women during and after pregnancy**, and persons subject to piles and fissure of the anus. In **abdominal operations**, **pelvic diseases**, **peritonitis**, **fevers**, especially in the constipation of typhoid fever, and **before or after a dose of santonin**, castor oil is the safest purgative to be used. **Diarrhœa**, infantile or otherwise, caused by indigestible or undigested food, yields to a dose of castor oil with or without a minute dose of Tr. Opii. It is an excellent remedy for **acute dysentery**, when given with opium which prevents griping, at the very onset (Castor oil 2 to 4 drs. and Tr. Opii 10 to 20 ms). Similarly in small doses (15 to 20 ms. with 5 to 10 ms. of Tr. Opii emulsified) it is serviceable in the **chronic variety**. As an **enema** it has been given with success in impaction of the large intestine and rectum. It may be rubbed over the stomach of children, in constipation.

Dosage and mode of administration.—The writer has seen that a minimum dose of 30 ms and a maximum dose of 8 ozs. were required to open the bowels of an adult. As a rule he never uses more than 4 to 6 drs. for a single dose to an adult. Children can bear sometimes large doses. A small tea-spoonful is not a large dose for a new-born babe. The cold-drawn castor oil is almost tasteless and can be given in the same way as cod-liver oil (see p. 488). However, the disagreeable smell and greasy and sickening taste can be very well covered by **emulsification** with mucilage of acacia, as in Mist. Olei Ricini, or with yolk of eggs, or by giving in **capsules**. The oil must be warmed in cold weather, before administration. Taken floating on hot coffee, or half a tea-cup of warm-water drunk two hours after a dose of the oil, often helps its operation. Food retards or delays its action. It is said that a few drops of oil of turpentine mixed with the oil, increases its purgative effect.

ROSÆ GALLICÆ PETALA. Red-Rose Petals.

N.O. *Rosaceæ.*

Syn. I.V.—*Goláp ful,* Beng. *Guláb ka papri* Hind.
Habitat.—Britain and France.
Source.—The fresh and dried unexpanded petals of *Rosa Gallica,* from cultivated plants.
Characters.—Little cone-like masses, or separate, purplish-red, velvety petals. Odor fragrant, roselike. Taste bitter, feebly acid and astringent.
Composition.—(1) *Oil of Rose* (*off*). (2) *Tannic* and *Gallic acids.*
Action.—Astringent. Used for coloring.

OFFICIAL PREPARATIONS.

1. **Confectio Rosæ Gallicæ.**—1 in 4. A soft violet-colored mass. Used as an excipient for pills.
2. **Infusum Rosæ Acidum.**—1 in 40 (¼ hour). Bright red. Astringent. **B.P. Dose.**—½ to 1 oz.
3. **Syrupus Rosæ.**—1 in 17. Red. Used for coloring. **B.P. Dose.**—½ to 1 dr.

ROSÆ OLEUM. Oil of Rose.

Syn. B.P.—Otto of Rose.
Source.—The oil distilled from the fresh flowers of *Rosa Damascena.*
Characters.—Pale yellow, crystalline semi-solid; odor strong, fragrant, of rose. Taste sweet. Sp gr. 0.856 to 0·860.

OFFICIAL PREPARATIONS.

1. **Aqua Rosæ.**—A saturated solution of the oil of rose, commercially prepared by distillation from Damask Rose. *Enters into.*—Mist. Ferri Co. and Rose basis for lozenges.
2. **Unguentum Aquæ Rosæ.** *Syn.—Cold Cream.*—1 in 4 nearly. A pleasant, fragrant and emollient application.

ACTIONS AND USES.

All preparations of rose are agreeable and fragrant vehicles. The infusion contains sulphuric acid, and is considered efficacious in **hæmoptisis, consumptive sweats** and as a gargle in **relaxed sore throat.** Eye-washes are often made of rose-water.

ROSMARINI OLEUM. Oil of Rosemary.

N. O. *Labiatæ.*

Habitat.—South of Europe and England.
Source.—The oil distilled from the flowering tops of *Rosmarinus officinalis.*
Characters.—Colorless or pale yellow; odor of rosemary; taste warm camphoraceous. Sp. gr. 0.900 to 0 915. *Solubility.*—2 in 1 of alcohol (90 p. c.).

Composition.—(1) *Terpene.* (2) *Stearoptene.* (3) Camphor ($C_{10}H_{16}O$) and borneol ($c_{10}H_{18}O$) in variable proportions. *Impurity.*—Oil of turpentine.

Action.—Rubefacient, stimulant, carminative. **B.P. Dose.**—$\frac{1}{2}$ to 3 ms.

Enters into.—Lint. Saponis, Tr. Lavend. Co., and the

OFFICIAL PREPARATION.

1. **Spiritus Rosmarini.**—1 in 10. *Dose.*—5 to 30 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is a stimulant and rubefacient to the skin, and is commonly used in the form of hair oil or hair wash, to promote the growth of hair on the scalp in **baldness.** It is combined with liniments for its odour.

Internally.—It is a powerful stimulant, antispasmodic, and carminative, like aromatic oils. It is rarely used internally. Whitla recommends the following as a valuable application in baldness.—Olei Rosmarini ʒiv, Liq. Epispastici ʒii, Ol. Amygdal. dulc ʒiss, Spt. Camph ℥ii, Glycer Borici ℥i, Ol. Rosæ m. viii, Tr. Jaborandi ℥i. Mix. A little to be rubbed into the roots of the hair every night.

SACCHARUM LACTIS. Milk sugar.

$C_{12}H_{22}O_{11}, H_2O.$

Syn. B P.—Lactose.

Source.—A crystallised sugar obtained from the whey of milk.

Characters.—Crystals or a crystalline mass, greyish-white, hard, odorless, faintly sweet. *Solubility.*—1 in 7 of cold, and 1 in 1 of boiling water.

Enters into.—The preparation of Ext. Bellad. Alcohol., Ext. Nucis Vom., Ext. Opii, Ext. Physos., Ext. Stroph., and Pulv. Elaterin. Co.

NON-OFFICIAL AND ALLIED PREPARATIONS.

1. **Human milk, Artificial.** (Frankland).—Heat $\frac{1}{2}$ pint of skimmed cow's milk to 95° F. and add rennet. After 10 to 15 minutes break up finely the curd thus formed and strain. After adding 110 grs. of milk sugar, boil the whey Strain again, and mix it with $\frac{2}{3}$ pint of fresh cow's milk, to which two tea-spoonfuls of cream have been added. For older children, a third part only of the casein is to be removed.

2. **Koumiss or Kumyss, Artificial**—True koumiss as prepared by the Tartars is a fermented mare's milk. Artificial koumiss may be brewed at home from cow's milk by any of the following processes. Dissolve grape sugar $\frac{1}{2}$ oz. in water 4 ozs and yeast 20 grs. in cow's milk 4 ozs. Pour them into a quart bottle, and fill it up with milk. Cork and wire it well, and leave it in a cool place, with occasional shaking.

Pour fresh rich butter-milk (which remains after the butter has been separated by churning) 1 part, water 2 parts, cow's milk 8 parts into a loosely covered jar or bottle and keep it in a warm place, say near a fire, for 36 to 48 hours, with frequent brisk shaking. A slightly effervescing rather sharp tasted fluid is the result. Its casein being partially digested by the fermentation of the sugar, koumiss is an easily assimilable nutritious food and remedy, most invaluable in the **wasting diseases of the lungs**, in which case, it can be taken *ad libitum*. It is borne by stomachs which refuse cod-liver oil. It is also very useful in **dyspepsia**, **infantile diarrhœa**, **kidney diseases**, and, in short, in any lingering disease.

3. **Kefir.**—Is a fermented milk like koumiss, the ferment being a Caucasian mushroom. It can also be made at home by kefir-ferment, which is a hard yellowish-brown, granular body, collected from the vessels in which true kefir is made, and sold by druggists. Thus a sparkling beverage is obtained within 24 hours. Useful in **scrofula**, **anæmia**, **chest diseases** and **dyspepsia**.

4. **Sanose**.—A palatable, digestive, white, odorless powder, consisting of casein 8, and albumose 2, given with milk or soup.

5. **Nutrose**. *Syn.—Sodium Caseinate.*—Colorless, odorless, almost tasteless soluble powder. Non-irritant and easily absorbed, given in **intestinal affections**. *Dose.*—1 to 4 tea-spoonfuls.

PHARMACOLOGY AND THERAPEUTICS OF MILK SUGAR

Internally.—It greatly increases the flow of urine and is therefore given in **cardiac dropsy** and **albuminuria**. Because it does not ferment in the stomach it is the best sweetening agent in **infantile dyspepsia**, and **irritable conditions of the stomach**. It is considered to be a physiological **accelerator of labor pains**, and for this purpose doses of 5½ to 7 drs. may be given, dissolved in half a pint of milk.

On account of its hardness it is used to facilitate the minute subdivision of other drugs, or to dilute potent substances and bring them up to a uniform standard.

SACCHARUM PURIFICATUM.

Refined Sugar. $C_{12}H_{22}O_{11}$.

Syn. B.P.—Sucrose. **Syn. I. V.**—*Misri*, *Chini*, Beng.

Source.—A crystallised sugar obtained from the juice of the sugar-cane.

Characters.—Well known

Enters into.—All syrups and lozenges, 3 confections, some mixtures, powders, pills, Liq. Calcis Sac., Sod. Citro. Tart. Efferves., Mag. Sulph. Efferves. and the

OFFICIAL PREPARATIONS.

1. **Syrupus**.—2 of Sugar and 1 water.

Enters into.—Creosote mixture, Pill of Iron, 9 syrups and Confec. Sulph.

2. **Syrupus Glucosi**. *Syn.—Glucosimide.*—As an excipient for pills.

ACTIONS AND USES.

Internally.—Sugar is a food, and tends to produce fat, and to maintain body-heat. It is a **demulcent** and may therefore be given in irritant poisoning, but it is mostly used as a basis of various refrigerent beverages and sharbets. It is added to various pharmaceutical preparations to cover the disagreeable taste of drugs.

SALICINUM. See page 196.

SALOL. See page 197.

SAMBUCI FLORES. Elder Flowers.

N. O. *Caprifoliaceæ.*

Habitat.—Britain.

Source.—The flowers of *Sambucus nigra*, separated from the stalks.

Characters.—Small ; calyx superior, five toothed ; corolla flat, rotate five-lobed, creamy white, with 5 stamens inserted in the tube ; anthers yellow. Taste bitter. Odor not agreeable.

Composition.—(1) *Valerianic acid.* (2) a *Resin.* (3) *Volatile oil.*

OFFICIAL PREPARATION.

1. **Aqua Sambuci.**—1 in 1. Colorless. A fragrant basis for skin lotions.

USES.

Elder flowers are believed to have no action except to perfume lotions. Elder-flower water is popularly used as a cosmetic and to remove freckles. It does not deserve to be retained in the B. P.

SANTALI OLEUM. Oil of Sandal Wood.

N. O. *Santalaceæ.*

Syn.—Oil of Santal wood, Oleum Santali Flavi, Yellow Santal Oil.

Syn. I. V.—*Chandan*, Beng.

Source.—The oil distilled from the wood of *Santalum album.* Chips or raspings of heart-wood which contain the volatile oil, are used for distillation.

Characters.—Pale yellow, viscid, odor strongly aromatic, taste pungent, spicy. Sp. gr. 0. 975 to 0. 980 *Solubility.*—1 in 6 of alcohol (90 p. c.). *Impurities.*—Castor oil, cedar wood and copaiba oils.

Composition.—(1) *Santalene a* ; (2) *Santalene b* (3) Two *Santalols;* (4) Santalic acid. (5) Various unknown bodies.

Action.—Like copaiba, Anti-gonorrhœic. **B.P. Dose.**—5 to 30 ms. in capsules and emulsion.

NON-OFICIAL PREPARATION.

1. **Capsules of oil of Sandal Wood.**—5 to 10 ms. in each. Midy's capsules contain 5 ms. in each and are most reliable. *Dose.*—10 to 12 capsules daily.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Sandal-wood oil is used in perfumery. In India it is sometimes applied to **scabies** with good effects.

Internally.—Its actions closely resemble those of copaiba. It is absorbed and is eliminated by the kidneys, **genito-urinary** and **bronchial mucous membranes**, which it **stimulates** and **disinfects**, especially the former. Posner thinks that it has a specific action on the prostatic portion of the urethra It is used with great benefit in 15 to 20 m. doses three times a day in **acute** and **chronic gonorrhœa**. When there is much burning, it is a good plan to give small doses (one or two capsules) every hour, to prevent the urine from irritating the mucous membrane. Being more pleasant, it can be given as a **substitute** for copaiba but the combination of the two has given splendid results in the writer's hands. It must be continued for two weeks, to prevent a recurrence, after the discharge is stopped. It has also been found serviceable in **chronic** or **fœtid bronchitis** and **cystitis** in 10 m doses A very good *emulsion* may be made by mixing the oil with tragacanth powder and adding quickly water with stirring.

Sandal wood.—Its paste made by rubbing the wood on a rough stone mortar with a little water removes **prickly heat**, mild local **cutaneous inflammation**, such as occurs after vaccination, **frontal headache**, **pruritus**, &c., when locally applied The decoction of the wood is considered as a diaphoretic and a vascular sedative (Æ. Ross).

SANTONINUM. Santonin. $C_{15}H_{18}O_3$.

N. O. *Compositæ.*

Source.—A crystalline principle prepared from Santonica, the dried unexpanded flower-heads or capitula of *Artemisia maritima*, var. *Stechmanniana.*

Characters.—Colorless, flat, rhombic prisms, feebly bitter, turning yellow by sunlight. *Solubility.*—Scarcely in cold, sparingly in boiling water; 1 in 4 of chloroform, 1 in 40 of cold and in 1 in 3 of boiling alcohol (90 p. c.).

Action.—A vermicide for round worms. **B.P. Dose.**—2 to 5 grs. ¼ to ½ gr. for a child 1 year old. 1 to 2 grs. for a child 2 to 5 years.

OFFICIAL PREPARATION.

1. **Trochiscus Santonini.**—1 gr. in each. *Dose.*—1 to 5.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Suppositorium Santonini.**—1 gr. in each. In thread-worms every 2nd or 3rd night 3 times.
2. **Santoninoxim.**—A santonin derivative in white crystalline powder. Less absorbable and non-toxic vermicide. *Dose.*—5 grs. or more, followed by a purgative; given in 2 doses with an interval of 1 or 2 hours.

3. **Sodii Santonas.**—Colorless crystals, soluble in water, turning yellow on exposure to light. *Dose.*—5 to 10 grs. in milk or orange syrup.

PHARMACOLOGY.

Internally. **Intestines.**—Santonin is a direct poison to round worms, *Ascaris lumbricoides*, killing them in the intestine Its action is less marked on thread worms, *Oxyuris vermicularis*, and it has no effect whatever on tapeworms. Some authorities assert it does not kill but paralyses the worms. It is the most valuable **anthelmintic** we have for the round entozoa.' This anthelmintic action is possibly due to an unknown oxidation product of santonin formed in the intestine. Santonin does not kill these worms outside the body. In vermicidal doses, it does not purge, but does so when given in larger quantities.

Blood.—Some of the santonin is absorbed and circulates as sodium santonate.

Nervous system.—It produces some curious effects here. Even in medicinal doses, within an hour or two after administration, objects first appear bluish, and then greenish or yellow, due perhaps to a certain disturbance of the retinal fibres, for though there is hyperæmia of the retina, yet the humours and other tissues of the eye are not stained. Taste and smell are sometimes affected.

Kidneys.—Santonin is chiefly excreted by the kidneys, and during its passage, **increases their secretion.** Sometimes, it may create dysuria or incontinence of urine in children. It colors **acid urine greenish yellow,** and **alkaline** urine **purplish red,** referable probably to an unknown oxidation product formed in the system and excreted with the urine.

Generative organs.—Its alleged emmenagogue properties have not been verified.

Toxic action.—In large doses, it causes headache, vomiting, purging, loss of consciousness and speech, cold sweats, depression of the heart and respiration, intense saffron colored urine, tremor, convulsions and death Sometimes a rash appears on the skin. Poisoning occurred in a child from 1½ grs. On the other hand recovery has taken place even after swallowing 1 oz. of the drug.

THERAPEUTICS.

Internally.—Santonin is chiefly employed for killing round worms. It should be given at night on an empty stomach, after a mild purge in the morning, followed by a purgative next morning. Calomel is the best purgative to use. To a child 2 or 3 years old 1 to 2 grs. of santonin may safely be given followed by a purgative next morning. The writer always gives it with calomel and sugar, followed, if necessary, by a plain dose of calomel next morning. For **thread worms,** it is best given in the form of an **enema** with castor oil. The suppository may answer as well, but thread worms are best treated by the injection of an infusion of quassia or one of the simple bitters. Santoninoxim being non-poisonous can be used instead, without the risk of evil effects. Its use in **amenorrhœa, dysmenorrhœa, incontinence of urine, color-blindness, amaurosis, albuminuria, &c.** have not been attended with good results.

SAPPAN. Sappan.

(*Ind. and Col. Addendum*).

Habitat.—India and Eastern Colonies.

Source.—The heart-wood of *Cæsalpinia Sappan.*

Characters.—Hard heavy sections, or orange red chips, showing well-marked concentric rings and rays.

OFFICIAL PREPARATION.

1. **Decoct. Sappan.**—1 in 20. **B.P. Dose.**—½ to 2 ozs.

PHARMACOLOGY AND THERAPEUTICS.

Formerly used as a dye and in the manufacture of red ink.

It contains tannin and is therefore employed in pharmacy to color mixtures red, especially when an astringent is indicated.

SAPO ANIMALIS. Curd Soap.

Source.—Soap made with sodium hydroxide and purified animal fat, consisting principally of stearin ; containing about 30 p. c. of water.

Characters.—White or greyish, dry, inodorous, horny and pulverisable when kept in dry warm air. Moulded when heated. *Solubility.*—Soluble in alcohol (90 p. c.), sparingly in cold, but soluble in hot water.

Enters into.—Ext. Colocynth. Co., Lin. Pot. Iod. c Sapon., Pil. Scammon. Co.

SAPO DURUS. Hard Soap.

Source.—Soap made with sodium hydroxide and olive oil, containg about 30 p. c. of water. It is an oleate of soda and is formed thus.—$C_3H_5(C_{18}H_{33}O_2)3 + 3\ NaHO = 3NaC_{18}H_{33}O_2$ (hard soap) + $C_3H_5(OH)_3$ (Glycerin).

Characters.—The same as above. *Impurities.*—Excess of alkaline hydroxide or carbonate.

Action.—Antacid, laxative. *Dose.*—5 to 15 grs. in pill.

Enters into.—Emp. Resin., Hyd. Oleas, Ung. Zinci, and 7 pill masses.

OFFICIAL PREPARATIONS.

1. **Emplastrum Saponis.**—1 of soap in 7. White, solid. As a protective to bedsores and for strapping.
2. **Pilula Saponis Composita.**—1 gr. of opium in 5. The name is used to disguise the composition. See page 504.

SAPO MOLLIS. Soft Soap.

Source.—Soap made with potassium hydroxide and olive oil.

Characters.—Yellowish-white or green, almost inodorous, of an unctuous consistence. *Solubility.*—Readily in alcohol (90 p. c.) and 1 in 4 of water.

Enters into.—Lint. Terebinth. and the

OFFICIAL PREPARATION.

1. **Linimentum Saponis**. *Syn.—Opodeldoc.*—1 in 12. A stimulant local application to sprains, bruises, and stiff joints.

Enters into.—Lint. opii.

NON-OFFICIAL PREPARATION.

1. **Mollin**.—A soft soap containing 30 p. c. of glycerin and 17 p. c. of uncombined fat. A basis for ointments.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Hard soap is a well known **detergent**, but should not be used in any case where the skin is irritable, especially in acute or "weeping" forms of **eczema**. **Seborrhœa, scaly eczema**, **sycosis** and **ichthyosis** do well when the parts are washed with soft soap before any remedial agents are applied. The liniment rubbed in over **sprained** or **stiff joints** promotes the absorption of inflammatory products, but how far this effect is due to the friction, or to the drug, is difficult to say. Soap plaster is a non-irritant protective to **abrasions** or **bedsores**, and strapping is very useful in **sprains, fractures, synovitis, arthritis**, &c, by affording mechanical support and pressure. Soaps can be mediciated with various drugs, such as carbolic acid, sulphur, tar, &c., in varying proportions. Mollin or super-fatted soap is not irritant and may be used with success in many skin diseases, and makes a good basis for ointments.

Internally.—Hard soap is **antacid**, and not being easily soluble may be used to **neutralise acid** in any part of the intestinal tract, which the soluble alkalies cannot reach It aids the emulsification of foods in the duodenum, and restores some of the normal constituents of bile. Large doses are said to dissolve **gall stones**, and to render the urine alkaline in **renal calculi**. A purified hard soap is sold for this purpose under the name of **Eunatrol**. The dose is 30 to 40 grs. per diem, in pills of 5 grs. each It is itself a gentle **laxative**, and corrects and aids the action of certain purgatives, such as jalap and aloes. Introduced into the rectum in the form of a cone as a suppository, it purges by reflexly contracting the rectum and colon, and is very useful in **infantile constipation**. Soap and warm water make an effective enema for **constipation of adults**.

Hard soap is used in pharmacy as a corrigiens and as a basis for pills and plasters, and the soft soap as a basis for some liniments.

SARSÆ RADIX. Sarsaparilla.

N. O. *Liliaceæ.*

Habitat.—South America, Costa Rica.

Source.—The dried root of *Smilax ornata*, imported from Costa Rica, and commonly known as Jamaica Sarsaparilla.

Characters.—Long, nearly cylindrical, tough, flexible roots, greyish-brown, folded together and bound with a root of the same plant into bundles of 18 in. long, 4 or 5 in. in diameter. The root $\frac{3}{16}$ in. thick, deeply wrinkled longitudinally, with numerous rootlets. Transverse section shows reddish-brown cortex and yellowish-white wood. Odorless. Taste bitter. *Impurities.*—Inferior varieties.

Resembles.—Senega, which is twisted and keeled. Hemidesmus, which is transversely cracked.

Composition.—(1) *Smilacin*, a neutral principle resembling saponin. (2) *Volatile Oil.* (3) *Resin*, *Starch*, &c.

Incompatibles.—Alkalies, which accelerate decomposition.

Action.—Alterative, diaphoretic and diuretic.

Official Preparations.

1. **Extractum Sarsæ Liquidum.**—1 in 1. Coffee brown. **B.P. Dose.**—2 to 4 drs.
2. **Liquor Sarsæ Comp. Conc.**—1 in 1. Dark brown. **B.P. Dose.**—2 to 8 drs.

Pharmacology and Therapeutics.

Internally.—The pharmacology of sarsaparilla is disputed Some believe that it is diaphoretic, diuretic and alterative, while others say that it is quite inert. As it is always given in combination with potassium iodide and other drugs in **rheumatism, syphilis, scrofula**, &c., it is difficult to judge its virtues in those diseases In India, it is still reckoned as a valuable alterative, and complex decoctions of sarsaparilla containing 50 to 60 ingredients are prescribed by *hakims* and *kavirajes.*

SASSAFRAS RADIX. Sassafras Root.

N. O. *Laurineæ.*

Habitat.—North America.

Source.—The dried root of *Sassafras officinale.*

Characters.—Large branched pieces, covered with bark. Bark rough, greyish-brown externally; internally smooth, glistening. rusty-brown. Odor aromatic; taste aromatic, astringent. Wood, soft, light, greyish-yellow; odor and taste like bark.

Composition.—(1) *Volatile oil*, consisting of *safrol* (see below) 90 p.c. and *terpene* 10 p. c. (2) *Sassafrin.* (3) *Resin*, *Tannic acid*, &c.

Action.—Diaphoretic. A flavoring agent.

Non-Official Preparation.

1. **Safrol.**—Largely obtained from Japanese camphor oil. Externally, it acts like menthol. Internally, it is given in rheumatism and sciatica. *Dose.*—20 to 30 ms.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The pharmacology of sassafras is unknown. It is said to possess slight **stimulant** and **diaphoretic** properties, on account of its volatile oil. It is generally used in combination with sarsaparilla and other drugs, as in Liq Sarsæ Comp. Conc., and occasionally for its flavor.

SCAMMONIÆ RADIX. Scammony Root.

N.O. *Convolvulaceæ.*

Habitat.—Syria, Asia Minor, and some parts of India.

Source.—The dried root of *Convolvulus Scammonia.*

Characters.—Brownish-grey, tapering or cylindrical, 1 to 3 in. in diameter, contorted; longitudinally furrowed. Crown enlarged, with remains of aerial stems. Fracture fibrous. Internally, color light or dark-grey. Odor characteristic. Taste at first sweetish, afterwards slightly acrid.

Resembles.—Belladonna root, which is shorter.

Action.—The juice of fresh root is a griping purgative.

SCAMMONIÆ RESINA. Scammony Resin.

Source.—Prepared by making a tincture from the scammony root, with alcohol (90 p.c.), and by adding water to precipitate the resin; then by washing and drying.

Characters.—Brownish translucent pieces, brittle. Fracture resinous. Odor sweet, fragrant. Does not form an emulsion with water. Soluble in alcohol and ether. *Impurities.*—Guaiacum resin which colors potato, blue. Jalapin resin, insoluble in ether.

Action.—Powerfully purgative. **B.P. Dose.**—3 to 8 grs. in pill or powder.

Enters into.—Ext. Colocynth. Co., Pil. Colocynth. Co., Pil. Colocyn. et Hyos. and the

OFFICIAL PREPARATIONS.

1. **Pilula Scammonii Composita.**—1 in 3 nearly. Purgative. **B.P. Dose.**—4 to 8 grs.
2. **Pulvis Scammonii Composita.**—1 in 2. Brown colored. Hydragogue purgative. **B.P. Dose.**—10 to 20 grs. 1 to 2 grs. for an infant 1 year old.

SCAMMONIUM. Scammony.

Syn. I. V.—*Sakmuniá. Sugmuniá.* Hind.

Source.—A gum-resin obtained by incision from the living root of *Convolvulus Scammonia*, known in commerce as Virgin Scammony.

Characters.—Flattened or irregular cakes, dark-grey or blackish, covered with grey powder. Brittle. Fracture glossy, resinous, porous, dark-brown. Thin fragments brown, translucent. Reduced easily to ash-grey powder and emulsifies with water. Odor characteristic. Taste acrid. *Impurities.*—Starch, chalk and resin prepared from the root.

Composition.—(1) *Resin* (*off.*) 70 p. c. (2) *Scammonin*, identical with convolvulin, a glucoside. (3) *Gum.* Scammonin is found in both gum-resin and resin.

PHARMACOLOGY.

Internally. **Gastro-intestinal tract and liver.**—Scammony and scammony-resin act like jalap. Its action begins only when it mixes with the bile in the duodenum. It is the taurocholate and glyco-cholate of soda of the bile, that help its activity. It powerfully stimulates the secretion of the muscular coat, though the contraction is irregular. As a result, free purgation occurs with griping in about 4 hours ; the stool being at first soft, but it soon becomes thin and watery. It is therefore a smart **hydragogue purgative.** It does not purge when injected into the blood, hence its action is entirely a local one. In large doses, it causes gastro-enteritis. It is used to complete the effect of other **vermifuges** for round and tape worms, and is a feeble **hepatic stimulant.**

THERAPEUTICS.

Internally.- Scammony or scammony resin is rarely used alone on account of its griping qualities. By combining it with other purgatives, its own severity of action is mitigated, while the action of others is promoted. It acts promptly when given with an alkali ; soap answering well. In **severe constipation** or **impaction of fæces**, the compound pill or powder can be given with advantage, care being taken that there is no gastro-intestinal irritation.

On account of its hydragogue properties, it can be given in cases, where depletion is necessary, as in **apoplexy**, or **cerebral congestion**, or where some effused fluid is to be absorbed, as in **dropsy.** Jalap answers better in such cases.

Though it is not a true **anthelmintic,** it can be used for the expulsion of intestinal worms, after a dose of santonin ; its irritant purgative properties dislodging the *parasites* from the intestinal canal.

SCILLA. Squill. N.O. *Liliaceæ.*

Habitat.—Mediterranean Coasts.

Source.—The bulb of *Urginea Scilla*, divested of its dry membranous outer scales, cut into slices and dried.

Characters.—The slices of the inner scales are curved, tapering towards both ends, yellowish-white or pinkish, 1 to 2 in. long, translucent, pulverisable when dry, not when moist, inodorous, bitter.

Composition.—Two active principles—(1) *Scillitoxin* or *scillain*, (2) *Scillipicrin.*

OFFICIAL PREPARATIONS.

1. **Acetum Scillæ.**—1 in 8. Filter through talc. **B.P. Dose.**—10 to 30 ms.
2. **Oxymel Scillæ.**—1 in 15 nearly. A thick opalescent brownish liquid. **B.P. Dose.**—½ to 1 dr. as an expectorant.
3. **Pilula Scillæ Composita.**—1 in 4 nearly. **B.P. Dose.**—4 to 8 grs.
4. **Pilula Ipecacuanhæ cum Scilla.**—(see page 457.).
5. **Syrupus Scillæ.**—1 in 17 nearly. A thick straw colored liquid. **B.P. Dose.**—½ to 1 dr. as an expectorant. 5 ms. for an infant 1 year old. *It should not be given with alkalies* as it contains acetic acid.
6. **Tinctura Scillæ.**—1 in 5. Straw colored. **B.P. Dose.**—5 to 15 ms.

PHARMACOLOGY.

Internally.—Squill acts like digitalis (*q.v.* page 371) in many respects. The description of the latter will therefore apply to that of the former, with the following distinguishing characteristics given below :—

1. Squill is a **more powerful gastro-intestinal irritant than digitalis**, causing nausea, vomiting, purging (even bloody stools), and intense inflammation of the membrane, in full doses, and occasionally symptoms of indigestion in medicinal doses. The actions are due partly to its local and partly to its remote effects, for they can be produced when the drug is applied to an abraded surface, or injected into a vein, subcutaneous tissue or serous cavity.

2. It increases the vascularity and the secretion of the bronchial mucous membrane, due probably to the excretion of the active ingredients of the drug. It is therefore a powerful **expectorant**. Digitalis has no such action.

3. Squill is a **more powerful diuretic** than digitalis. It acts in two ways.—(a) Like digitalis it raises the blood-pressure especially in the renal arteries. (b) The active ingredients being excreted by the kidneys, act as direct stimulants to the renal cells, and may cause considerable irritation of those organs.

THERAPEUTICS.

Internally.—Squill can be given in cardiac and other forms of **dropsy**, because its action closely resembles that of digitalis, but its diuretic action is considerably increased, and its irritant properties are somewhat mitigated, when it is combined with digitalis. Even then, it is safe to occasionally suspend its administration for a while. Baly's or Guy's pill (see p. 377) is an excellent combination, and an efficient diuretic in **cardiac dropsy**. It is rarely prescribed alone and is contra-indicated in acute renal disease or if there be gastro-intestinal irritation.

As an expectorant, it should not be given in acute **bronchitis**, but **exclusively in its later stages** especially when the pulse is soft and skin is moist. It also should not be used in **phthisis,** if the digestive powers are liable to be deranged. In the **chronic bronchial affections** of children, the oxymel or syrup is always serviceable in 10 to 15 m. doses, but its indiscriminate use in all varieties of bronchial affections is to be deprecated. Squill becomes doubly beneficial in **chronic catarrh** of dropsical patients.

It is never given as an emetic or purgative, though Whitla recommends the syrup as an emetic in combination with ipecacuanha wine in 30 m. doses repectively, to a child one year old.

The active principles are powerful cardiac poisons.

SCOPARII CACUMINA Broom tops.

N. O. *Leguminosæ.*

Habitat.—Great Britain.

Source.—The fresh and dried tops of *Cytisus scoparius.*

Characters.—Stem dark green, with long, straight, alternate branches, which like the stem, are winged, tough and flexible. The leaves if present are small, sessile and simple above, stalked and trifoliate below. Taste bitter and nauseous. Odor peculiar when bruised, if fresh. Odorless when dry.

Composition.—(1) *Scoparin,* a yellow crystalline neutral principle. (2) *Sparteine,* an oily, liquid, volatile alkaloid, which resembles digitalis in its action.

Action.—Diuretic.

Official preparations.

1. **Infusum Scoparii.**—Made with *dried* tops. (1 in 10.) **B.P. Dose.**—1 to 2 ozs.
2. **Succus Scoparii.**—Made with *fresh* tops. A brown juice. **B.P. Dose.**—1 to 2 drs.

Non-Official preparations.

1. **Sparteinæ Sulphas.**—Colorless crystals, soluble 3 in 2 of water. *Dose.*—¼ to 1 gr.
2. **Oxysparteina.**—An oxidation product of sparteine, in white granular crystals, very soluble, forming strongly alkaline solutions. *Dose.*—½ to 1½ grs.
3. **Oxysparteinæ Hydrochloridum.**—In transparent crystals, freely soluble in water. May be used hypodermically. *Dose.*—½ to 1½ grs. daily.

Pharmacology and Therapeutics.

Broom has no external action. As it contains two active principles scoparine and sparteine, broom is a valuable **diuretic.** Sparteine increases the force of the heart like digitalis, and has been recommended for use where digitalis is contra-indicated but it is not so certain in its action. Broom is usually prescribed with other diuretics in all forms of **dropsy,** especially cardiac and **interstitial nephritis**. Haustus Scoparii Compositus, consisting of Pot Tartras. 20 grs. Sp. Juniperis 30 ms., and Decoct. Scoparii. ad. 1 oz is a very valuable combination, but it should never be prescribed for acute Bright's disease. Sparteine is said to be of value in cardiac failure, complicating **infantile diphtheria**

SENEGÆ RADIX. Senega root.

N. O *Polygaleæ.*

Habitat.—North America.

Source.—The dried root of *Polygala Senega.*

Characters.—Slender roots 2 to 4 in. long, of which the upper end is an irregular knotted tuberosity with remains of small stems, tapering below into a tortuous wrinkled keeled root, ¼ to ½ in. thick. Bark yellowish or brownish grey, transversely cracked. Fracture short. Odor distinctive; taste at first sweetish, afterwards acrid causing a flow of saliva.

Resembles.—*Arnica, Valerian, Serpentary and Green Hellebore,* but these have no keels.

Composition.—(1) *Senegin,* a glucoside, which is identical with *Saponin,* the active principle of *Quillaia bark.* It is a white powder, which forms a soapy emulsion when mixed with boiling water. It acts like *Digitonin* (see p. 371). (2). *Polygalic acid.*

Action.—Stimulant Expectorant.

OFFICIAL PREPARATIONS.

1. **Infusum Senegæ**.—(1 in 20). **B.P. Dose**.—½ to 1 oz.
2. **Liquor Senegæ Concentratus**.—**B. P. Dose**.—½ to 1 dr.
3. **Tincture Senegæ**.—Sherry colored. 1 in 5. **B.P. Dose**.—½ to 1 dr.

PHARMACOLOGY.

Externally.—Senega is an *irritant* to the skin

Internally. **Alimentary canal**.—In large doses it *irritates* the tract, producing salivation, vomiting, and diarrhœa. Small doses cause indigestion.

Circulation.—It is slowly absorbed and senegin circulates as such in the blood. It is a **cardiac depressant**, and removes the systolic standstill produced by digitalis. It arrests the heart in diastole. It is excreted by the skin, bronchial mucous membrane, and the kidneys.

Respiration.—The powdered root, if inhaled, causes **sneezing** and cough The action is chiefly directed to the bronchial tubes, through whose mucous membrane it is excreted. The bronchial mucous membrane is irritated by the excretion of senegin, which causes vascular dilatation, greater secretion, and reflexly, cough. Senega is therefore a **stimulating expectorant**.

Skin and Kidneys.—Senega is also excreted by these organs, and stimulates their actions moderately. Therefore it is a mild **diuretic** and **diaphoretic**.

THERAPEUTICS.

The chief use of senega is as a **stimulating expectorant.** As it is an irritant to the bronchial mucous membrane, it must not be given in acute bronchitis, nor, on account of its gastro-intestinal action, when there is indigestion.

The indications for the use of senega are when the power to expectorate is small, but the quantity of matter to be expectorated is abnormally large, and it is more or less purulent in character as in the **second stage of acute bronchitis** and **pneumonia in the stage of resolution.** When the expectoration is tough and scanty, this remedy is useless. It is of value in **brochiectasis** but should *not* be prescribed for the cough of **phthisis.** Some hold that senega sets up constant coughing by stimulating the respiratory centre or the efferent nerves, and thus empties the tubes and does not allow the mucus to accumulate. Farquharson believes that it acts as a tonic to the unstriped muscles of the bronchial tubes and thus aids in the expulsion of their contents. There is no doubt that the best effects are obtained when senega is combined with ammonii carbonas. According to professor Schmiedeberg, senega is not the best member of the group of stimulating expectorants ; quilladia is not only better but less nauseating and cheaper. It contains the same active principle (saponin) and in much larger proportion

Under senega the pulsations of the heart become less frequent ; it is therefore useful **when the heart is weak and dilated.** It has also been recommended to *relieve the distressing pulsations of* **aortic disease** and to *counteract the effects of* **an overdose of digitalis.** As a **diuretic**, senega is weak and uncertain in its action, but is said to be an excellent diaphoretic in **chronic rheumatism.**

It has lately been extolled as a remedy for **amenorrhœa** ; for which purpose it is given in saturated decoction for two weeks before the expected period.

Senegin, in 2 gr. doses, has proved successful as a means of arresting **uterine hæmorrhage.**

Very small doses of senega (3 ms. to ½ oz.) **emulsify fats and oils**, and the tincture may be used with advantage in *making the mistura olei ricini.*

SENNA ALEXANDRINA. Alexandrian Senna.

N. O. *Leguminosæ.*

Habitat.—Egypt.

Source.—The dried leaflets of *Cassia acutifolia.*

Characters.—¾ to 1¼ in. long, ¼ to ½ in. broad, lanceolate or oval-lanceolate, acute *unequal at the base*, entire, thin, brittle, pale greyish-green. Surface finely pubescent, with distinct veins on the under surface. Odor faint, tea-like. Taste mucilaginous, unplasant.

Resembles.—Leaves of *Uva Ursi* and *Buchu*; all of which are equal at the base.

SENNA INDICA. East Indian Senna.

Syn. B.P.—Tinnivelly Senna.

Habitat.—Southern India.

Source.—The dried leaflets of *Cassia angustifolia.*

Characters.—Usually varying from 1 to 2 in. in length, lanceolate, acute, unequal at the base, thin, entire, yellowish-green, smooth above, somewhat duller beneath. Glabrous or slightly pubescent. Odor and taste as above.

Composition of both kinds.—(1) *Cathartic acid*, an amorphous purgative glucoside. It exists as salts of earthy bases which are soluble in water. (2). Other glucosides, *sennacrol* and *sennapicrin*, soluble in water. (3) *Chrysophanic acid.* (4) A sugar, *catharto-mannite.*

Action.—Simple purgative.

OFFICIAL PREPARATIONS OF EITHER KIND.

1. **Confectio Sennæ.**—**B.P. Dose.**—60 to 120 grs.
2. **Infusum Sennæ.**—(1 to 10). **B.P. Dose.**—½ to 1 oz.
3. **Liquor Sennæ Concentratus.**—**B.P. Dose.**—½ to 1 dr.
4. **Mistura Sennæ Composita.** *Syn.—Black Draught.*—Contains magnesium sulphate (1 in 4). **B.P. Dose.**—1 to 2 ozs.
5. **Pulvis Glycyrrhizæ Compositus.**—Senna is the most important ingredient (2 in 12). **B.P. Dose.**—60 to 120 grs.
6. **Syrupus Sennæ.**—**B.P. Dose.**—½ to 2 drs.
7. **Tinctura Sennæ Composita.**—1 in 5. **B.P. Dose.**—½ to 1 dr. for repeated administration; 2 to 4 drs. for a single dose.

PHARMACOLOGY.

Externally.—None.

Internally.—Senna is a **laxative** or brisk **purgative** according to the dose used The cathartic acid in it, stimulates both the secretion and peristaltic action of the intestines, especially the colon, and produces pale yellow watery stools, containing some undigested food. It is not a cholagogue. Large doses cause **griping.** It possesses none of the tonic effects of rhubarb; on the other hand, purgation by senna does not cause subsequent constipation. It may however cause the urine to be red. Injected into the veins, it causes vomiting and purging. It is eliminated with all the secretions, and will purge the child when given to nursing women.

THERAPEUTICS.

Senna is a safe puragtive in slight cases of **simple constipation** and **fæcal accumulation**, but, for its tendency to gripe and nauseous taste, it is rarely given alone.

It is largely used *to complete the effect of duodenal purgatives*, in the form of blue pill at bed time or black draught in the morning. To make the draught agreeable Ext. Glycyrhizæ liq. may be added to it. The compound liquorice powder is to be preferred to the black draught, as it is a very nasty mixture. This preparation is largely used in **habitual constipation** and the **constipation of pregnancy**. Confection of senna, either with or without sulphur, is a valuable laxative in **hæmorrhoidal conditions** and when coated with chocolate, forms the well-known **Tamar Indien**, which is so readily taken by children.

It is said that the infusion contains more cathartic acid than the other preparations. Combined with gentian, it is an admirable remedy for **dyspepsia with constipation**. The following was a favorite prescription of the late Dr. Abernethy.—Inf. Gentian. Co. 1 oz., Inf. Sennæ 4 drs., Tinct. Cardam. Co. 1 dr.

Cathartic acid is often given and is a safe, mild purgative ; rarely producing nausea or griping. It can be prescribed in combination with syrup of virginian prune, which completely disguises the taste. The dose for an adult is 5 grains.

Prescribing hints.—Infusion of senna soon decomposes ; this can be prevented by the addition of 1 grain of nitre to each ounce of the infusion. The griping property of the black draught may be prevented by adding a few ms. of Tr. Cardamon. Co.

SERPENTARIÆ RHIZOMA. Serpentary Rhizome.

N. O. *Aristolochiaceæ.*

Syn.—Virginia snake root.

Habitat.—North America.

Source.—The dried rhizome and rootlets of *Aristolochia serpentaria* or of *Aristolochia reticulata*.

Characters.—Rhizome ⅛ in. thick, 1 in. long. The upper surface bearing remains of aerial stems ; and under surface, numerous wiry interlacing roots of about 3 inches long. Dull yellowish brown. Odor aromatic, camphoraceous with a strong aromatic bitter taste.

Resembles.—*Valerian* and *Arnica*, but can be distinguished by the smell.

Composition.—(1) A bitter principle, *Aristolochin.* (2) A volatile oil. (3) Resin.

Action.—Bitter stomachic.

Enters into.—Tinctura Cinchonæ Compositus.

OFFICIAL PREPARATIONS.

1. **Infusum Serpentariæ.**—1 in. 20. **B.P. Dose.**—½ to 1 oz.
2. **Liquor Serpentariæ Concentratus.**—**B.P. Dose.**—½ to 2 drs.
3. **Tinctura Serpentariæ.**—1 in 5. (Alcohol 70 p.c.) **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

It is a **bitter stomachic** and **stimulating expectorant** ; also said to be a **cardiac stimulant, diaphoretic** and **diuretic**. Small doses act like other bitter tonics ; large ones irritate the gastro-intestinal tract throughout its extent, with production of much flatulence. It is chiefly used, as a vehicle for other drugs, in **bronchitis** and **typhoid fever.** Said to be useful in the **amenorrhœa** of **anæmia** and **chlorosis.** Many properties are ascribed to it, but most of these are imaginary. It is strongly recommended by Garrod in **gout** and is said to be a useful *substitute for guaiacum*, when people are unable to take that drug.

SESAMI OLEUM. Sesame oil.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern, African and North American Colonies.

Source.—The oil expressed from the seeds of the *Sesamum Indicum*.

Characters.—A pale yellow, limpid oil ; faint odor, bland taste.

PHARMACOLOGY.

Used as a *substitute for olive oil*, to make liniments, ointments and plasters.

SEVUM PRÆPARATUM. Prepared suet.

N. O. *Ruminantia*

Source.—The internal fat of the abdomen of the sheep, *Ovis aries* purified by melting and straining.

Characters.—Well known.

Composition.—(1) *Olein*, 30 p.c. (2) *Palmatin.* (3) *Stearin.*

Action.—(*a*) externally, emollient. (*b*) internally, nutritive.

Enters into.—Unguentum Hydrargyri.

NON-OFFICIAL PREPARATION.

1. **Sevum Phosphoratum.**—10 p.c. Used as a concentrated fatty basis for the preparation of many of the compound phosphorus pills.

SINAPIS. Mustard.

Source.—Black and white mustard seeds powdered and mixed.

Characters.—A greenish yellow powder, with an acrid, bitter, and pungent taste ; inodorous when dry, but exhaling when moist a characteristic pungent odor. *Impurities.*—Starch and flour.

Action.—Counter-irritant, emetic.

OFFICIAL PREPARATION.

1. **Charta Sinapis.**—Mustard powder, after the *fixed* oil has been extracted with benzol, is mixed with Liquor Caoutchouc and spread on cartridge paper.

SINAPIS ALBÆ SEMINA. White Mustard seeds.

N. O. *Cruciferæ.*

Syn. I. V.—*Dhóp-rai.* Beng. *Sufed-rai*, Hind.

Source.—The dried ripe seeds of *Brassica alba.*

Characters.—The seeds about $\frac{1}{12}$ in. diameter, $\frac{1}{10}$ gr. in weight. Roundish, pale yellow, very finely pitted and reticulated testa. Externally hard; internally yellow, oily. Inodorous when entire or powdered, taste pungent.

Composition.—(1) A bland fixed oil. (2) *Sinalbin* and *Myrosin*; Myrosin converts *sinalbin* into a fixed pungent body called *acrinyl isothiocyanate*, *glucose*, and *sinapin sulphate*, in presence of water.

SINAPIS NIGRÆ SEMINA. Black Mustard seeds.

Syn. I. V.—*Rai-sarisha*, Beng. *Makra-rai*, Hind.

Source.—The dried ripe seeds of *Brassica nigra.*

Characters.—Scarcely half the size of white mustard seeds, and dark reddish or greyish brown in color, internally yellow.

Composition.—(1) The same fixed oil. (2) *Sinigrin* and *Myrosin.* On the addition of water, the latter converts sinigrin into the official volatile oil of mustard (which is *allyl isothiocyanate*), *glucose*, and *potassium hydrogen sulphate.*

OLEUM SINAPIS VOLATILE. Volatile oil of Mustard.

Source.—The volatile oil distilled from *black* mustard seeds after maceration with water.

Characters.—Colorless or pale yellow, intensely pungent and irritant with an acrid taste. Sp. gr. 1.018 to 1.030. *Solubility.*—1 in 50 of water, readily in spirit and in ether.

Composition.—95 p.c. of *Allyl isothiocyanate.*

OFFICIAL PREPARATION.

1. **Linimentnm Sinapis.**—Contains 4 p.c. of volatile oil. 1 in 27.

NON-OFFICIAL PREPARATIONS.

1. **Spiritus Sinapis.**—Volatile oil 1, alcohol (90 p.c.) 49.
2. **Thiosinamin.** *Syn.*—*Rhodallin.*—Formed by warming oil of mustard with alcoholic solution of ammonia. Soluble in water, alcohol, and ether. Solution, 15 to 20 p.c., used hypodermically for **lupus** and **uterine affections.** Use with caution.

PHARMACOLOGY.

Externally.—Mustard is a powerful local **irritant, rubefacient,** and **vesicant.** When it is first applied, there is a sensation of **warmth,** followed by **severe burning pain,** due to the irritant action of the mustard on the sensory nerves and increased local blood-supply. This irritation is quickly followed by paralysis, as a result of this there is **loss of sensibility,** and a diminution both of the pain produced by the mustard and of any that may have existed previously. Mustard is also a **counter-irritant** The excitation of the sensory nerves may **reflexly stimulate the cardiac and respiratory centres** and sometimes may be used to restore consciousness after fainting.

Internally. **Gastro-intestinal tract.**—Taken in small doses as a *condiment*, mustard causes a sense of warmth in the stomach, stimulates the secretion of gastric juice and peristalsis, and therefore sharpens the appetite. In larger doses, it acts as a prompt and efficient *emetic*, without causing any of the usual depression.

THERAPEUTICS.

Internally.—A linseed poultice having a little mustard (1 in 16) dusted over it is a very common and efficacious *irritant* and *counter-irritant* in **rheumatism, pleurisy, pneumonia, bronchitis,** and many **febrile diseases.** (See page 472).

A pure mustard plaster, when applied to the skin, will soothe pain in **gastralgia, colic, neuralgia, lumbago,** &c. When put over the epigastrium it often **relieves vomiting,** and when applied to the calves of the legs, it is an excellent reflex stimulant in cases of **syncope, asphyxia,** and **coma.**

Severe **headache, common colds,** and **febrile conditions,** especially in children, are greatly relieved by a hot **pediluvium,** or foot-bath, whilst **infantile convulsions** may constantly be checked by immersion of the whole of the patient's body in a hot mustard bath, containing one tablespoonful of mustard to each gallon of water.

A mustard **sitz bath** (*i. e.* hip-bath) may be taken at the time of the period to induce **menstruation,** when it has been suppressed by a chill.

Internally.—As an **emetic,** mustard is specially valuable in narcotic poisoning on account of its reflex stimulant effects. Give one to four teaspoonfuls in a tumbler of warm water.

SODIUM. Sodium. Na.

Source.—The metal sodium as met with in commerce. It decomposes water and must therefore be kept under naphtha in stoppered botttles.

Characters.—Well known.

Enters into.—Liquor Sodii Ethylatis.

NON-OFFICIAL PREPARATIONS.

1. **Pasta Londinensis.**—Caustic soda and unslaked lime, equal parts. Less painful than Vienna Paste (see p. 552).

TOXICOLOGY OF THE CAUSTIC ALKALIES.

Persons are not often poisoned by the caustic alkalies, but accidents occasionally happen through their swallowing by mistake either *pearl ash*, which is a mixture of potassium carbonate and potash, or *soap-lees*, which contain the corresponding sodium salts.

The symptoms are a caustic taste in the mouth and burning heat in the throat, the mucous membrane of which becomes swollen, soft and red. This is followed by pain in the stomach, vomiting, diarrhœa. feebleness of the pulse and general collapse. On post-mortem examination, the whole mucous membrane from the mouth to the stomach is found red, swollen and excoriated.

Treatment.—Any rapidly acting emetic, or hypodermic injection of apomorphine. If no emetics available, give copious draughts of warm water and tickle back of throat with a feather. After vomiting has occurred, give (1) **feeble acids** (*e. g.* vinegar, lime-juice, dilute acetic or citric acid). (2) **demulcents** (oil, linseed tea, white of egg).

N. B.—*Do not wash out the stomach with the stomach-pump, as there is danger of damaging the softened mucous membrane.*

SODA TARTARATA. Tartarated Soda.

$KNaC_4H_4O_6, 4H_2O$.

Syn. B.P. – Sodium Potassium Tartrate

Syn. Commercial.—*Rochelle Salt. Seignette's Salt.*

Source.—Add acid potassium tartrate to a hot solution of sodium carbonate, and allow to crystallise out.

Characters.—Large, colorless, transparent, crystalline prisms, with a saltish taste. *Solubility.*—1 in 2 of cold water. *Impurity.*—Acid potassium tartrate.

Action.—Diuretic, purgative.

B.P. Dose.—30 to 60 grs. (diuretic), $\frac{1}{4}$ to $\frac{1}{2}$ oz. (purgative).

OFFICIAL PREPARATION.

1. **Pulvis Sodæ Tartaratæ Effervescens**. *Syn.—Seidlitz Powder.—Dose.*—Dissolve the contents of the blue paper in half a pint of water, add contents of white paper, and drink during effervescence.

SODII CITRO-TARTRAS EFFERVESCENS.

Effervescent Sodium Citro-Tartrate.

Source.—Sugar 15 ozs , Sodium Bicarbonate 51 ozs., Citric Acid 18 ozs., Tartaric acid 27 ozs. Heat till the mixture assumes a granular form. **B.P. Dose.**—60 to 120 grains, freely diluted.

SODII SULPHAS. Sodium Sulphate.

$Na_2 SO_4, 10H_2 O$.

Syn.—Glauber's salts. "Sal Mirabile."

Source.—The interaction of sulphuric acid with various sodium salts.

Characters.—Colorless, transparent, efflorescent prisms, which undergo watery fusion when heated. Neutral. Taste saline. *Solubility.*—3 in 1 of cold water. *Impurities.*— Fe. and Ammon. salts.

Action.—Saline purgative, cholagogue.

B.P. Dose.—60 to 120 grs. for repeated administration, or one dose of $\frac{1}{4}$ to $\frac{1}{2}$ oz.

Official Preparation.

1. **Sodii Sulphas Effervescens.**—B.P. **Dose.**—60 to 120 grs., or one dose of ¼ to ½ oz., freely diluted.

Non-Official Preparations.

1. **Sodii Persulphas.**—Small white granular crystals, soluble in water. Recommended to stimulate appetite in **tuberculosis.** Useful in **dyspepsia with hyperacidity,** and in **gastric cancer.** *Dose.*—1 to 3 grains, in water, before meals.

2. **Sodii Sulphas Acidus.** *Syn.*—*Sodium Bisulphate.*—To purify water which has been contaminated by Typhoid stools. Fifteen grains to a pint of water will destroy *Bacillus Typhosus* in 15 minutes.

3. **Sodii Sulphas Exsiccatus.**—The anhydrous salt, much more convenient for dispensing, especially in powders. *Dose.*—½ to 2 drs.

4. **Sodio-Magnesii Sulphas Effervescens.**—Introduced by Martindale as a substitute for *Hunyadi Janos* and *Pullna waters.* *Dose.*—A teaspoonful, or more, taken in half a tumbler of water half an hour before breakfast.

5. **Chloro-Sodio-Magnesian Aperient.**—A similar preparation, but contains some sodium chloride. Resembles *Friedrichshall Water.* Useful in **migraine.** *Dose.*—a teaspoonful.

6. **Sal Carolinum Factitium. P. G.**—Artificial Carlsbad Salt.—Dried Sodium sulphate 44, Potassium sulphate 2, Sodium chloride 18, Sodium bicarbonate 36. *Dose.*—20 to 60 grains, in warm water. 53 grs. to 1 pint water resembles *Carlsbad water.*

7. **Pulvis Salis Carolini Factitii Effervescens. P. P. C.**—Dried Sodium sulphate 11 ozs., Potassium sulphate ½ oz., Sodium chloride 4½ ozs., Sodium bicarbonate 54 ozs., Tartaric acid 40 ozs., Gluside 28 grs. Dry separately, then mix. *Dose.*—60 to 120 grs. Resembles *Kutnow's powder.*

Pharmacology of Sodium Sulphate, Citro-tartrate and Tartarated Soda.

Internally. **Intestines.**—Sodium salts are absorbed much more slowly than the corresponding ones of potassium : consequently they pass on into the intenstines, where they act as **saline purgatives,** causing a soft painless motion two or three hours after administration. Sodium sulphate is the most active of the three ; it is also a **cholagouge.** There are three theories as to the manner in which these saline purgatives produce loose motions.—(1) That a quantity of water, corresponding to the endosmotic equivalent of the salt, is attracted from the blood through the intestinal wall, and that this water forms the greater part of the loose motion (2) That the secretions of the glands of both the large and small intestines are strongly stimulated by these salts. (3) That the peristaltic movements of the intestines are accelerated by these foreign bodies, and that consequently the chyme reaches the rectum sooner and in a less digested condition. The truth of the matter seems to be that saline purgatives produce a true secretion chiefly from the small intestines. This secretion is not a product of osmosis, but the result of irritation by the salts, the low diffusibility of which prevents its re-absorption. The peristaltic action is also somewhat increased.

Blood and Kidneys.—They render the **blood and urine more alkaline**, but in this respect act more feebly than potassium salts. Sodium sulphate has undoubtedly **some effect on metabolism**, and experiments on rabbits have shown that it causes an increase of 10 to 15 p c. in the consumption of oxygen for several hours. Injected into the blood, these salts have no purgative effect.

THERAPEUTICS.

Internally. **Intestines.**—These salts are extremely valuable in the treatment of **chronic constipation**, especially when associated with **gout**, **congestion of the liver**, or **uric acid diathesis**. They should always be taken freely diluted in warm water, first thing on rising in the morning when the stomach is empty. As sodium sulphate is a cholagogue, it should be selected whenever there is **disease of the liver** or in cases of **gall stones**. It is also useful in certain forms of **dysentery**. It is the active principle of *Carlsbad*, *Marienbad*, *Tarasp*, and *Condal* waters; and it occurs **in combination with magnesium sulphate** in *Aesculap*, *Hunyadi Janos*, *Pullna*, *Rubinat*, *Apenta*, and *Kissingen waters*. *Friedrichshall water* contains **sodium chloride**, in addition to the above mentioned. Directions for making imitations of these waters have been given under the head of "non-official preparations." In **large doses**, these salts produce **copious watery stools**, and are used to **remove dropsical accumulations**, especially when due to **cirrhosis of the liver**.

SODII BICARBONAS. Sodium Bicarbonate.

$NaHCO_3$.

Source.—See preparation of potassium bicarbonate.

Characters.—In dry white powders of small monoclinic crystals with a saline taste. Slightly alkaline. Soluble 1 in 11 of cold water. *Impurities.*—The carbonate. *Twenty grains neutralize 16. 7 grains of citric acid or 17. 8 grains of tartaric acid.*

Incompatibles.—Acids and acid salts; *e. g.* bismuth subnitrate.

B.P. Dose.—5 to 30 grs.

OFFICIAL PREPARATION.

1. **Trochiscus Sodii Bicarbonatis.**—(Rose basis) 3 grs. in each.

PHARMACOLOGY.

The same as that of the potassium salt, except that it is much more slowly absorbed, that it causes less gastro-intestinal irritation, and like all sodium salts is only feebly depressant.

THERAPEUTICS.

Externally.—A lotion (7 grs. to 1 oz.) is employed as a sedative, to **relieve itching**. The powder, either applied dry or made into a paste, has a magical effect in relieving the pain of **burns** or **scalds**, but it must be applied immediately. As a mouth-wash, it **relieves toothache** and protects the teeth from the corrosive action of acid medicines. The wash also cures headache depending on the irritation on the teeth.

Internally.—In **frontal headache without constipation**, where the pain is just at the junction of the forehead with the hairy scalp, sodium bicarbonate given before meals often affords relief. (N. B. If the pain is just above the eyebrows, give dilute nitromuriatic acid after meals, and if there be constipation, give magnesium sulphate) Very useful in **stomach-cough**, due to irritation of the gastric terminations of the vagus. Give 1 dr. in a tumblerful of water and order to be slowly sipped. It is very valuable as a remedy for **dyspepsia**, especially that form due to *Butyric acid fermentation*, the symptoms of which are pain at the pit of the stomach coming on between meals and relieved by food, heartburn, acid eructations, flatulence, and constipation. For this purpose give before meals, and combine with bismuth and a simple bitter. It then acts in the following ways :—(1) It has a *sedative action on the gastric nerves.* (2) It *liquefies tenacious mucus.* (3) It *promotes the secretion of the acid gastric juice*, which destroys the Bacillus Butyrici. (4) It *combines with the hydrochloric acid of the gastric juice*, with the formation of carbonic acid and sodium chloride. The former assists in absorption from the intestines, and the latter promotes the digestion of albumens. In **duodenal ulcer** with excessive pain Brunton recommends bicarbonate of soda one teaspoonful dissolved in a tumbler of limewater. It plays an important part in the treatment of **diabetes**. many patients being sent to drink the waters of Vichy (sodium carbonate) or Carlsbad (sodium sulphate and carbonate). In threatened **diabetic coma**, dissolve 300 grains of bicarbonate of sodium in one pint of milk and let it be drunk during the twenty four hours. If coma is well-marked, transfuse it into the cellular tissue of the breast or axilla, or throw it up the rectum. In a severe case, the patient ought to get 500 grains of sodium bicarbonate in the day. It **loosens the bronchial secretion**, but less so than the corresponding potassium salt. It is of no value in **uric-acid diathesis**, as urate of sodium is less soluble than urate of potassium.

Prescribing hints.—Remember that you must always prescribe the carbonate of bismuth with bicarbonate of sodium and not the subnitrate, which will liberate carbonic acid and cause the cork to fly out of the bottle. For children, combine with a grain of rhubarb and sugar. If sodium bicarbonate is given simply for the purpose of neutralizing excess of acid in the stomach, then exhibit it after meals.

SODII CARBONAS. Sodium Carbonate.

$Na_2CO_3, 10H_2O$.

Syn.—Soda, or Washing Soda.

Source.—From sodium chloride either by interaction with ammonium bicarbonate or by its conversion into sodium sulphate and the action of heat on a mixture of the sulphate with carbon and calcium carbonate.

Characters.—Transparent, colorless, rhombic crystals, efflorescent. Taste caustic. Soluble 1 in 2 of cold water. *Twenty grains neutralize 9·8 grains citric acid, or 10·5 grains of tartaric acid. Impurities.*—Sulphates and Chlorides.

B.P. Dose.—5 to 30 grs. **Enters into.**—Extractum Ergotæ.

SODII CARBONAS EXSICCATUS.

Exsiccated Sodium Carbonate.

Source.—Sodium carbonate deprived of its water of crystallisation by gently heating.

Characters.—A dry white powder, nearly anhydrous.

Enters into.—Pill. Ferri (carbonate of iron is formed).

B.P. Dose.—3 to 10 grs.

PHARMACOLOGY AND THERAPEAUTICS.

These resemble those of potash, except that they are less caustic.

SODII CHLORIDUM. Sodium Chloride.

NaCl.

Syn.—Common salt.

Source.—Occurs native.

Characters.—Well-known. *Solubility.*—1 in. 2¾ of cold water.

B.P. Dose.—10 to 240 grs.

PHARMACOLOGY.

Sodium chloride is a very important constituent of many mineral waters. How it acts in the system is not clearly known, but the following facts have been ascertained. It **accelerates osmosis** in the tissues, thus **increasing the albuminous waste** and consequently the **amount of urea excreted** from the system. To eliminate this salt a greater quantity of water is required in the urine; consequently sodium chloride acts as a **diuretic**. This water is abstracted from other organs, and therefore common salt **promotes thirst**. It also **increases the production of lymph** in the tissues and promotes its circulation. Outside the body it **increases the action of ptyalin, trypsin, and pepsin**; whilst in the stomach it **promotes the secretion of pepsin**, and **expedites absorption**

It is an **indispensible article of diet with all vegitarians**, especially those whose food contains large quantities of potassium salts, but it does not appear to be required by meat-eaters. This is probably due to the fact that the blood-plasma contained in the interstices of the meat supplies all the sodium chloride that is necessary. Bunge has an ingenious theory that the potassium salts in vegetable food combine with the sodium chloride of the blood, thus rendering it useless and causing its elimination from the body. This appears rather far-fetched, and the true explanation is probably that given above. If salt be withheld from the diet, general weakness, anæmia, and dropsy ensue. In large doses, common salt is a prompt **emetic**. Injected into the rectum, it kills **Oxyuris vermicularis or thread-worm**.

THERAPEUTICS.

Externally.—Cold douching with salt and water is a very valuable remedy in all forms of **muscular weakness**, especially in the *weak back* of growing girls, and in **lateral curvature of the spine**.

Sea-bathing is a **mild general stimulant**. If the patient is unable to proceed to the sea side, *Tidman's sea salt* or, in India, ordinary rock-salt is an efficient substitue. One pound of salt to three gallons of water is the proper proportion. At Droitwitch and Nantwitch concentrated hot salt baths are largely used for **chronic rheumatism**, **sciatica**, and **joint-diseases**, in which conditions they give great relief.

Sixty grains of common salt in one pint of water constitutes **normal saline solution**, which may be injected either into the veins or the rectum or the loose connective tissue under the axilla or breast, in various conditions of collapse and unconsciousness. By this method of treatment many lives have bee saved in **uræmia**, **eclampsia**, and in the **shock following severe operations**, and **post partum hæmorrhage**.

It is also useful in the **second stage of cholera** and **in diabetic coma** but, in these cases, the benefit is only temporary. It may however revive the patient sufficiently to enable him to settle his worldly affairs, and should therefore never be omitted.

Jenning's formula for normal saline solution is rather more elaborate; as follows:—Sodium chloride 50 grs., potassium chloride 3 grs., sodium snlphate 2½grs., sodium phosphate 2 grs. Dissolve in 1 pint of water, and add alcohol (90 p. c.) 2 drs.

This formula is made by Burroughs and Welcome in their *Soloid Sodii Chloridi Comp.* Two Tabloids are required for one pint of normal saline solution.

Internally.—Cold salt and water is an excellent **gargle** for **chronic relaxed throat.** It is a prompt and efficient **emetic,** and it may be injected into the rectum either for the cure of **thread-worms,** or for the relief of **obstinate constipation in children.** In doses of one drachm given every second or fourth hour it has distinct **expectorant** qualities. It is an antidote in **poisoning by silver nitrate,** which it converts into the insoluble chloride. It is also useful in cases where a **leech has been swallowed or has got up the nose.**

Dried salt, with three times the amount of elm-bark and a little hyoscyamus may be applied to the os uteri in **subinvolution,** when it relieves congestion in the same way as a glycerin plug.

Betz has given it in **internal hæmorrhages,** with marked benefit. He dissolves one drachm in half a pint of water, and administers three tablespoonfuls every five minutes. In **hæmoptysis,** half a teaspoonful of the undissolved salt may be given in one dose and repeated occasionally till it excites nausea. Nothnagel, and other observers, report cures of **epilepsy** and **migraine** by one drachm doses.

LIQUOR SODII ETHYLATIS.

Solution of Sodium Ethylate. C_2H_5ONa.

Source.—By dissolving 22 grains of sodium in 1 oz. of absolute alcohol. Contains 18 p. c. of sodium ethylate. *Sp. gr.* 0·867.

Characters.—A syrupy liquid, colorless when fresh, turning brown on keeping.

Dispensing hint.—Always prepare fresh as required.

PHARMACOLOGY AND THERAPEUTICS.

The most manageable and effective of all our caustics. Used as a **depilatory,** and to **destroy warts, moles,** and **nævi.** Several cases of **lupus** have been cured by its use. Apply lightly with a pointed glass rod for 2 or 3 successive days till a scab forms. When this falls off, repeat the treatment, if necessary. Permit no water to touch the part The application causes little or no pain. If pain results, allow a drop of chloroform to fall upon the spot; this converts the sodium ethylate into ether and sodium chloride, and stops all caustic action.

SODII NITRIS. Sodium Nitrite.

$NaNO_2$.

Source.—Prepared by heating sodium nitrate with lead.

Characters.—White, deliquescent, crystalline granules, or in sticks. Taste cooling, saline. *Solubility.*—2 in 3 water.

B.P. Dose.—1 to 2 grs.

PHARMACOLOGY AND THERAPEUTICS.

Possesses similar properties to amyl nitrite and nitroglycerin (which see) but it is slower in its action than the former and does not cause so much throbbing and headache as the latter. Useful in **angina pectoris, aortic disease**, and in the increased arterial tension which accompanies **granular kidney**. Lubinski has used it with marked success in **hemicrania**, and in **asthmatic affections** of purely bronchial and neurotic origin.

For asthma, it should be given in doses of 3 to 5 grains, frequently repeated, and it is specially useful when combined with hyoscyamus.

SODII PHOSPHAS. Sodium Phosphate.

$Na_2HPO_4, 12H_2O$.

Syn.—Hydric-di-sodic phosphate. *Tasteless Purging Salt.*

Source.—Prepared by digesting bone-ash with sulphuric acid, then filtering to remove calcium sulphate, and finally adding sodium carbonate to the solution.

Characters.—Transparent, colorless, efflorescent rhombic prisms. *Solubility.*—1 in 6 of cold water. *Impurity.*—Calcium phosphate.

Action.—Aperient, cholagogue, diuretic, antirheumatic, nervine tonic.

B.P. Dose.—30 to 120 grs. for repeated administration, or one dose of ¼ to ½ oz.

OFFICIAL PREPARATION.

1. **Sodii Phosphas Effervescens.**—Prepared as the other effervescing preparations. **B.P. Dose.**—30 to 60 grs., or one dose of ¼ to ½ oz. in 3 to 6 ozs. of water.

NON-OFFICIAL PREPARATION.

1. **Sodii Phosphas Exsiccatus.**—Mixes with other powders without deliquescing. *Dose.*—10 grs. in warm liquid.

PHARMACOLOGY.

Internally. **Gastro-intestinal tract.**—In small doses it is **antacid**, and in larger doses it is a **mild aperient** and **cholagogue.** It is a **powerful hepatic stimulant** to the dog.

Blood.—It is a constituent of normal human blood, and therein can combine with or give off carbonic acid, becoming converted into monosodic phosphate and vice versa, thus:—

$$Na_2HPO_4 + CO_2 + H_2O = NaH_2PO_4 + NaHCO_3.$$

Kidneys.—It increases the excretion of uric acid, and is a **diuretic.**

THERAPEUTICS.

Sodium phosphate is practically tasteless; it is therefore very suitable as a **mild aperient**, well suited for a **delicate** stomach, and **for administration to children**. Useful in **bilious sick headache** and **jaundice**. It has been recommended for **hepatic calculi**, in doses of 60 grs. three times a day, and if gastro-intestinal catarrh be present, small doses of sodium arsenate (one twentieth of a grain) may be added.

It may be used as a substitute for sodium salicylate in **acute articular rheumatism**, and the subcutaneous injection (2 grains) has been recommended in **nervous affections**. It has been asserted that a patient has been cured of **locomotor ataxy** by this method, but doubts have recently been thrown on this case.

SODII SULPHIS. Sodium Sulphite.

$Na_2SO_3, 7H_2O$.

Source.—Prepared by passing sulphurous acid gas through a solution of sodium carbonate.

Characters.—Colorless transparent prisms. *Solubility.*—1 in 4 of water. **B.P. Dose.**—5 to 20 grs.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The solution (1 in 8) has been used in the treatment of various **parasitic skin diseases**.

Internally.—It is decomposed in the stomach, giving off sulphurous anhydride, and is therefore used in fermentative diseases of that organ characterised by the presence of **sarcinæ** and **torulæ**.

It is a **very feeble antiseptic**, and is not of much value in medicine.

SODII CHLORAS.

Sodium Chlorate. *(Non-off.)*

Source.—Prepared in the same way as the corresponding potassium salt.

Characters.—Large, regular, modified tetrahedric crystals, colorless. Taste saline, mawkish but not disagreeable. Fuses and deflagrates when exposed to a red heat. *Solubility.*—1 in 2 of water, 1 in 34 of alcohol. *Dose.*—10 to 30 grs.

PHARMACOLOGY AND THERAPEUTICS.

This salt is to be preferred for many purposes for which potassium chlorate is used, especially in **stomatitis with ulceration along the edge of the gums**. Doses of 2 to 4 drachms daily have given great relief in **gastric cancer**.

SODII CINNAMAS.

Sodium Cinnamate. *(Non-off.)*

Syn.—*Hetol.*

A solution, 1 in 20, in distilled water or saline solution has been intravenously injected, with benefit, in **phthisis**.

SODII CITRAS.

Sodium Citrate. *(Non-off.)*

Characters.—Small granular crystals, resembling common salt.

Dose.—10 to 60 grs. May be given as a **refrigerant**, in preference to potassium citrate.

SODII HIPPURAS.

Sodium Hippurate. *(Non-off.)*

A white, amorphous powder, readily soluble in water.

Dose.—5 to 30 grains.

Recommended in **gout**, **gravel**, and **calculus**, as a solvent of urates. If the urine of the patient be abnormally acid, add an alkaline citrate.

SODII PERAMANGANAS.

Sodium Permanganate. *(Non-off.)*

The solution, *green* in color, is used as a disinfectant. (See p. 563).

SODII PEROXIDUM.

Sodium Dioxide. *(Non-off.)*

A white, amorphous, deliquescent powder. Dissolves in water with production of heat and evolution of oxygen.

One part, with 8 of ice, forms a bleaching and antiseptic solution, used by dentists in **tooth-stopping**. Unna recommends the use of an anhydrous soap containing 10 to 20 p.c. of sodium dioxide, and made into a paste with liquid paraffin, in the treatment of **acne**.

SODIUM SILICATE, Solution of.

(Non-off.)

Syn.—*Soluble glass*, *Water glass.*

A viscid, treacly solution, containing 10 p.c. of caustic soda, and 20 p.c. of silica. Has a remarkable power in arresting the putrefaction of organic mattar. Used as an injection in **ozœna**, **leucorrhœa**, **gonorrhœa**, **cystitis**, and **uterine ulceration**. Must be freely diluted.

SODII SULPHO-ICHTHYOLAS.

Sodium Sulpho-ichthyolate. *(Non-off.)*

Syn.—*Sodium Ichthyol sulphonate.*

Source.—Prepared from a bituminous quartz found in the Tyrol, consisting of fish and animal remains. It is first treated with sulphuric acid, and then neutralised with soda. Ammonium, lithia, and zinc sulpho-ichthyolates are prepared in the same way. The best known is the ammonium salt, to which the name of **Ichthyol** has been given.

Characters.—All of them are viscous, brownish, almost black substances, with a disagreeable tarry odor. They contain a considerable amount of sulphur (15 p.c. in Ichthyol), which exists partly in direct combination with carbon (as in mercaptan), and partly in close combination with oxygen, so that the whole is soluble and absorbable. *Solubility.*—Soluble in water, oils, fats, glycerin, and vaseline.

Action.—Antiparasitic, antiseptic, local anæsthetic, resolvent.

Dose.—(For all four salts) 10 to 30 grs.

NON-OFFICIAL PREPARATONS.

1. **Ichthyol Collodion.**—1 in 7. For eczema and erysipelas.
2. **Salve mulls,** containing 10 grammes of ichthyol in ⅕ sq. metre.
3. **Solutio Ichthyol.**—10 to 30 p.c. in equal parts of alcohol and ether.
4. **Suppositoriæ Ichthyol.**—3 grs. in each. *Add 1 gr. of beeswax to give firmness to the oil of theobroma.*
5. **Unguentum Ichthyol.**—20 to 50 p.c., with lanoline, or olive oil and lard.
6. **Unguentum Ichthyol Compositum, G. H.**—Ichthyol 1, limewater 9, lanoline 5, vaseline 10, zinc ointment 5.
7. **Pasta Ichthyol**—Starch 40, water 20, ichthyol 40, strong solution of albumen 1. To be painted on the skin. Quickly dries and is easily washed off. Recommended by Unna for **acne rosacea.**
8. **Ichthalbin.**—A combination of ichthyol and albumen. A tasteless odorless brown powder. *Dose.*—¾ to 15 grs. In **eczema** and **nervous intestinal affections,** and during convalescence from fevers.
9. **Ichthargan.** *Syn.—Silver Thio-hydrocarburo-sulphonate.*—A powerfully antiseptic odorless brown powder, containing 20 p.c. of silver. Soluble in water and glycerin.
10. **Petrosulfol.**—Resembles ichthyol, but prepared from a pitch containing sulphur. For **boils, chilblains, eczema,** and **impetigo.**
11. **Thiol.**—A mixture of sulphonised hydrocarbons, prepared by heating gas-oil with sulphur. Exists in two forms (a) **thiol siccum,** a black powder, or in laminæ, (b) **thiol liquidum,** a syrupy liquid containing 40 p.c. of the latter. A substitute for ichthyol. Dose.—(Of dry) 2 to 10 grs.
12. **Anytin.**—Contains 33 P. C. of *Ichthyol-sulphonic acid.* Possesses the property of rendering substances like phenol readily soluble in water. These compounds are called **Anytols,** *e. g. Meta-cresol-anytol* (**Metasol**) contains 40 P.C. of meta-cresol ; *Eucalyptol-anytol* (**Eucasol**) contains 12½ P.C. of eucalyptol. These solutions are used as antiseptics.

PHARMACOLOGY AND THERAPEUTICS OF SULPHO-ICHTHYOLATES.

Ichthyol, which will be taken as the type, was introduced by Unna in 1882 as a remedy for chronic skin diseases : since then it has been found to possess the following virtues (1) it is an **antiseptic,** and kills most disease germs, (2) it is a **local anæsthetic,** (3) it **contracts the small vessels,** (4) it **promotes the absorption of exudations,** (5) it **increases the body-weight** and **improves the general health,** and (6) it **saturates the system with sulphur,** thus possessing all the good properties of that drug (which see). It is free from toxic properties, and ten-times the ordinary doses may be taken without ill effects. It is valuable in all diseases where there is **capillary engorgement**, and it is reported to have given good results in **chronic rheumatism, pleural effusions, syphilis, asthma, chlorosis, scrofula, phthisis, catarrhs of the various mucous membranes**, and in various **neuralgiæ** and **uterine disorders.**

A 3 p.c. injection is valuable in **gonorrhœa**, and a 30 p.c. solution is recommended for **prurigo senilis.** Externally the 30 p c. ointment is employed for **wounds** and **burns of the first and second degree**, when it relieves pain at once and slight burns heal rapidly. A 50 p.c. ointment gives excellent results in **erysipelas**, and the collodion may be used for the same purpose. The ointment, in varying strengths, is also useful in **eczema, acne, psoriasis, herpes, erythema, boils, carbuncles, ringworm** and **favus.**

The ichthyol paste is an elegant application for **acne rosacea**, whilst the solution in ether and alcohol gives immediate and permanent relief in **erythema nodosum.** As a suppository, in combination with conium, it will be found every soothing application in **hæmorrhoids** and **fissure of the anus.** Ichthalbin is insoluble in the stomach and only splits up in the duodenum. It is intended for internal use only. Four parts are equivalent to three of ichthyol.

Thiol siccum makes a very good dusting-powder in **herpes** and **burns.** The following is an excellent formula :—thiol 1, starch 1, zinc oxide 2, talc 16. Or a solution (1 in 4), or ointment (1 in 3) may be used. Solutions of ichthargan and the various anytols are powerful antiseptics, and metasol has an energetic action on **diphtheritic processes.**

Prescribing hint.—The odor of ichthyol may be disguised with oil of citronella, which is itself used in Ceylon for rheumatism.

SODII TAUROCHOLAS. Sodium Taurocholate.

(Non-off.)

Source.—Prepared from pig's bile.
Characters.—A white amorphous powder.
Dose.—2 to 6 grains, in pill, keratin-coated.
Recommended for **gouty obesity** and **dyspepsia.**

SODII TELLURAS. Sodium Tellurate.

(Non-off.)

A valuable remedy for checking the **night-sweats of phthisis.** Should be given in doses of one third to two thirds of a grain in pill daily. Imparts the characteristic tellurium smell to the breath, and may cause diarrhœa if the lungs be extensively diseased.

SODÆ CHLORINATÆ LIQUOR. See page 325.
SODII ARSENAS. See page 173.
SODII BENZOAS. See page. 269.
SODII BROMIDUM. See page 279.
SODII CACODYLAS. See page 174.
SODII HYPOPHOSPHIS. See page 533.
SODII IODIDUM. See page 453.
SODII SALICYLAS. See page 195.
SODII SULPHOCARBOLAS. See page 181.

STAPHISAGRIÆ SEMINA. Stavesacre Seeds.

N. O. *Ranunculaceæ.*

Habitat.—England.

Source.—The dried ripe seeds of *Delphinium staphisagria.*

Characters.—Irregularly triangular, arched on one side, blackish-brown, with wrinkled and pitted testa. Smell none. Taste bitter, acrid.

Composition.—Two alkaloids (1) *Staphisagrine*, a powerful respiratory poison resembling Curare. (2) *Delphinine*, which resembles Aconitine and Veratrine in its action. (3) A *fixed oil.*

Action.—Parasiticide.

OFFICIAL PREPARATION.

1. **Unguentum Staphisagriæ.**—1 in 5. Heat with the lard on a water-bath for two hours.

PHARMACOLOGY AND THERAPEUTICS.

The ointment has been employed externally in **neuralgias**, and internally the drug has been given in **asthma, rheumatism,** and **dropsies**; but it is never used nowadays except as a **parasiticide to kill pediculi**.

The ointment acts most satisfactorily in destroying **lice in the head**, but when used for **body-lice** it should be also rubbed into the garments which are worn next the skin, as this is where the parasite lives. The ointment is said to be perfectly safe but it should be used with caution as it contains at least two poisonous alkaloids, and the student should bear in mind that there are other parasiticides which are equally effectual and less dangerous.

STRAMONII FOLIA. Stramonium Leaves.

N. O. *Solanaceæ.*

Habitat.—England.

Source.—The dried leaves, collected whilst the plants are in flower, of *Datura stramonium*, the thorn-apple.

Characters.—Greyish-green, ovate, petiolate, 4 to 6 in. long, unequal at the base, with dentate margin and acuminate apex. Taste saline and bitter. The leaves are minutely wrinkled.

Identification.—Belladonna and hyoscyamus leaves resemble stramonium, but the former are less wrinkled and the latter are hairy.

Incompatibles.—Caustic alkalies, metallic salts, and mineral acids.

Composition.—An alkaloid, *Daturine*, which is identical with Hyoscyamine and isomeric with Atropine. It exists as a malate.

Action.—Narcotic, antispasmodic, deliriant.

OFFICIAL PREPARATION.

1. **Tinctura Stramonii.**—Percolate. 1 in 5. **B.P. Dose.**—5 to 15 ms.

STRAMONII SEMINA. Stramonium Seeds.

Source.—The dried seeds of the above-mentioned plant.

Characters.—Small, reniform, pitted and wrinkled, flattened, brownish-black. Taste bitter.

Composition.—As of the leaves, but the proportion of alkaloids is more constant.

OFFICIAL PREPARATION.

1. **Extractum Stramonii.**—Alcoholic. **B.P. Dose.**—¼ to 1 gr.

PHARMACOLOGY AND THERAPEUTICS.

Its action resembles that of belladonna, but it has a much more powerful effect in relaxing the muscular coat of the bronchial tubes, and it may cause irregularity of the heart's action. It is rarely used except for the relief of the paroxysms of **asthma**, for which purpose it may be smoked as cigarettes or the fumes may be inhaled, or it may be given internally. When combined with potassii nitras, lobelia, black tea, and oil of anise it resembles the well-known *Himrod's*, *Bliss's* and *Green Mountain cures.* Cannabis Indica is also an excellent adjuvant.

Toxicology.—Poisoning by stramonium is fairly common in England, and the seeds of *Datura alba* and *fatuosa* are largely used by the *road-poisoners in India*, who mix them with sweetmeats or food, or give them to their victim to smoke, with the object of robbery.

The *symptoms* are ;—dryness of the throat, giddiness, flushing of the face, dilatation of the pupils, and a peculiar form of delirium associated with ludicrous movements, followed by coma which may end in death.

Treatment.—Emetics, stomach-pump, stimulants, cold affusion, artificial respiration. If much delirium, give opium, but opium is less useful in these cases than atropine in opium poisoning.

Brunton recommends the cautious use of physostigma, and Ringer advises pilocarpine nitrate in ¼ to ½ grain doses.

Detection.—Datura seeds resemble those of capsicum, but may be distinguished by the absence of a pungent taste and by the embryo being less curled. There are no special chemical tests for Daturine, but the physiological test (action on the pupil) is extremely delicate.

STROPHANTHI SEMINA. Strophanthus Seeds.

N. O. *Apocynaceæ.*

Habitat.—Equatorial East Africa.

Source.—The dried ripe seeds of *Strophanthus Kombé*, freed from awns.

Characters.—Greenish-fawn, $\frac{3}{5}$ in. long, $\frac{1}{6}$ in. broad, blunt base, tapering apex, sides flattened, one side having a median ridge and the other being convex, covered with silky appressed hairs. Characteristic odor. Taste very bitter. A section of the seed should give a green color with sulphuric acid.

Composition.—(1) A transperent, white, micro-crystalline glucoside *Strophanthin*; which is the active principle. It is closely allied to Digitalin. Melts at 172.75° C., and splits up into Strophanthidin and the methyl-ether of a peculiar sugar. *Gives a green reaction with sulphuric acid.* The seeds contain 8 to 10% of it. Soluble in water, insoluble in chloroform and ether. Its physiological action resembles that of *Ouabain* (see below). (2) *Combic acid.* (3) *Inein*, an active principle.

Note.—*Strophanthus hispidus* contains a glucoside, *Pseudo-strophanthin*, which differs from Strophanthin in giving a red color with sulphuric acid, and in melting at 179° C. It is twice as active as the former.

Action.—Cardiac tonic.

OFFICIAL PREPARATIONS.

1. **Extractum Strophanthi.**—Dried powdered seeds percolated first with ether, then with alcohol, again dried and diluted with milk-sugar. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr.
2. **Tinctura Strophanthi.**—1 in 40, made with alcohol (70 p. c.). Percolate. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Ouabain.**—A crystalline glucoside, extracted from the Somali arrow-poison of East Africa. It is prepared from Ouabaio wood, *Akanthera Ouabaio*, of the same natural order as strophanthus. Colorless, rectangular lamels, slightly soluble in cold water, freely in hot. *Gives a red color with sulphuric acid*, and resembles Strophanthin in its physiological action but is twice as poisonous and twice as rapid. Produces anæsthesia of the cornea and conjunctiva. Has been recommended in **whooping-cough**, in doses of $\frac{1}{1000}$ to $\frac{1}{250}$ gr. every three hours.
2. **Strophanthin.**—Already described. *Dose.*—$\frac{1}{300}$ to $\frac{1}{100}$ gr. Only used hypodermically. Unreliable, and inferior to Tr. Strophanthi.
3. **Pilula Strophanthi.**—Containing 4 or 8 ms. of Tr. Strophanthi, mixed with sugar of milk. *Dose.*—1 to 3 pills.
4. **Tabellæ Strophanthi.**—Containing 4 ms. of tincture, with a chocolate basis. *Dose.*—1 to 5 tabloids.

PHARMACOLOGY.

Externally.—Both ouabain and strophanthin cause **anæsthesia of the conjunctiva and cornea.**

Internally. **Gastro-intestinal tract.**—In small doses it is a **stomachic tonic**, and large doses may cause nausea and vomiting, but it is **less irritating than digitalis.**

Muscles—It is a **powerful poison to all striated muscles,** which it stimulates strongly.

Heart.—Action exactly **similar to that of digitalis** (which see p. 372). It however **acts more quickly** and **does not accumulate** in the system.

Vessels.—It does **not contract the peripheral vessels,** and therefore causes less rise of blood-pressure than digitalis.

Kidneys—It is **less powerful as a diuretic** than digitalis, as it causes no change in the renal vessels, and the increased secretion of urine is merely due to more powerful action of the heart.

Nervous System.—It appears to have some **sedative action on the cerebrum and medulla.**

Respiratory System.—No effect.

THERAPEUTICS.

The *Kombe arrow-poison* of the Zambezi negroes is made from strophanthus, and its physiological action was discovered by a missionary, who accidentally got some of the poison on his toothbrush.

Introduced into medicine by Fraser as **a substitute for digitalis**, especially in cases of **chronic interstitial nephritis with increased arterial-tension.** It is said to be particularly useful in **mitral stenosis,** but on the whole it has not come up to the expectations formed of it. It is a **feeble diuretic** and therefore *digitalis should always be used when diuresis is required.*

It possesses the following advantages over digltalis :—(1) it is less likely to cause vomiting, (2) it does not accumulate in the system, (3) it acts more quickly and its effects pass off more rapidly, (4) it does not cause contraction of the small arteries.

In the treatment of **mitral disease** *the rule is to begin with digitalis* and then change to strophanthus if the former disagrees ; and where a prolonged course of treatment is required, as in cases of **failing compensation,** it will be found a highly satisfactory plan to give digitalis for two months, and then strophanthus, combined with Easton's syrup, for one month. It has given good results in **exophthalmic goitre,** and is said to be of special value in **renal insufficiency,** the **cardiac failure of prolonged typhoid fever,** and in **heart-weakness of a functional nature.**

STRYCHNINA. Strychnine.

See page 496.

STYRAX PRÆPARATUS. Prepared Storax.

N. O. *Hamamelaceæ.*

Habitat.—Asia Minor.

Source.—A purified balsam, obtained from the trunk of *Liquidamber orientalis.*

Characters.—A semi transparent, semi-fluid, brownish-yellow balsam, having a balsamic taste and an agreeable odor.

Composition.—(1) *Styrene*, a derivative of cinnamic acid. (2) *Cinnamic acid*, which can be oxidised into benzoic acid. (3) *Styracin*, which is cinnamate of cinnamyl. (4) *Two resins.*

Identification.—Resembles Confectio Sulphuris, but distinguished by its taste and smell.

Action.—Expectorant, parasiticide. **B.P. Dose.**—5 to 20 grs.
Enters into.—Tinct. Benzoini Composita.

PHARMACOLOGY AND THERAPEUTICS.

Resembles benzoin and the balsams of Peru and Tolu in its action. It is a **feeble expectorant** and has some tonic effect on the mucous membrane of the genito-urinary tract. Twenty grains, made into a bolus with liquorice, is occasionally used in **gonorrhœa**, but it is rarely given internally except in the form of Friar's Balsam. Mixed with an equal part, or twice its bulk of olive oil, it is efficacious in **scabies** and **phthiriasis**, but albuminuria has been known to follow its application.

SULPHONAL. Sulphonal.

$(CH_3)_2\ C(SO_2C_2H_5)_2$.

Syn.—*Dimethyl-methane-diethylsulphone.*

Source.—It is an oxidation product, resulting from the combination of mercaptan with acetone, and may be regarded as methane (CH_4) in which two atoms of H. are replaced by two molecules of diethyl-sulphonic acid, and two other atoms of H. by two molecules of methyl.

Characters.—Colorless crystals, or powder, without smell or taste. *Solubility.*—1 in 450 of cold, 1 in 15 of hot water, 1 in 90 of alcohol or ether; 1 in 3 of chloroform.

Action.—Hypnotic. **B.P. Dose.**—10 to 50 grs.

NON-OFFICIAL PREPARATIONS.

1. **Tabellæ Sulphonal.**—5 grs. in each. *Dose.*—1 to 6. Should be crushed before swallowing.
2. **Haustus Sulphonal, G.H.**—Sulphonal 30 grs., mucilage 2 drs., syrup 30 ms., water 1 oz. *Dose.*—1 oz.

TRIONAL. *(Non-off.)*

$(C_2H_5),\ (CH_3)\ C(SO_2C_2H_5)_2$.

Syn.—*Diethylsulphone-ethyl-methyl-methane.*

Source.—Sulphonal, modified by the substitution of one molecule of ethyl for one molecule of methyl.

Characters.—Minute shining crystals. *Solubility.*—1 in 300 of water. *Dose.*—1 to 30 grs.

TETRONAL. *(Non-off.)*

$(C_2H_5)_2, C(SO_2C_2H_5)_2$.

Syn.—*Diethyl-methane-diethylsulphone.*

Source.—Sulphonal, in which two of the methyl groups have been replaced by two of ethyl.

Characters.—Shining white, crystalline tablets, or acicular crystals, with no smell but a camphoraceous bitter taste. *Solubility.*—1 in 450 of water; 1 in 15 of alcohol. *Dose.*—10 to 20 grs.

PHARMACOLOGY AND THERAPEUTICS.

Sulphonal is a pure **hypnotic**, and does not depress the heart like chloral, or cause the disagreeable after-effects of opium. It is very useful in simple **insomnia** and may safely be given in cases where chloral would be dangerous, as in heart-disease. On the other hand, it is powerless in the sleeplessness due to pain, and cannot produce that soothing effect on the brain which is induced by morphia. Its administration is sometimes followed by **hæmatoporphyrinuria**, especially in women; and its long-continued use may be followed by **nephritis**, with **albuminuria**, **ischuria** and **oliguria**, as well as characteristic disturbances of digestion and the nervous system. Luckily however it rarely leads to the "sulphonal habit."

It has yielded good results in **chorea**, in **trismus neonatorum**, and in **diabetes**; aud it **relieves spasms and cramps in fractured limbs.**

Although enormous doses have been taken without any ill results, the administration of the drug is not without risk when administered to patients in a state of physical prostration, and alarming symptoms have occured after 20 grain doses given to patients convalescent from influenza. *Restlessness*, *palpitations*, *giddiness*, and *confusion of thoughts have occasionally been observed* to take the place of sleep, and this is *particularly likely to happen if the patient be suffering from chronic constipation.* This is a fact that is well worth bearing in mind. Sulphonal has also a remarkable power, when given in small doses, of **checking or preventing the night sweats of phthisis.**

Trional and tetronal resemble sulphonal in their effects, but they are more prompt in their action and are slightly cumulative, their toxicity appearing to increase in proportion to the increase in the ethyl groups. They have been largely used in **mental diseases**, in which sulphonal has little or no effect. Tetronal is the best sedative, but trional is the most popular, and is most useful in **neurasthenia** and **organic brain disease**. It is also very valuable in the **sleeplessness of children.**

Prescribing hints—Sulphonal may be given either in cachets or suspended in mucilage, but the best method of administration is to dissolve it in two-thirds of a tumblerful of *boiling* water and then stir until it is cool enough to drink. It will then act very speedily, whereas when given in cachet it may remain undissolved in the stomach for hours, giving the patient no relief at night, and making him feel sleepy all the following day.

SULPHUR SUBLIMATUM.

Sublimed Sulphur.

Syn.—*Flowers of Sulphur.* **Syn. I. V.**—*Gandak*, Beng.

Source.—By sublimation from crude or rough sulphur.

Characters.—A greenish-yellow gritty powder, without taste or smell unless heated, when it evolves fumes of sulphurous anhydride. *Impurities.*—Sulphide of arsenic, sulphurous and sulphuric acids. *Solubility.*—Insoluble in water, or alcohol ; slightly soluble in oils and fats ; completely soluble in carbon disulphide.

Tests.—Water agitated with it should not redden litmus paper (absence of free acid), and when filtered should not give a precipitate with sulphuretted hydrogen (absence of arsenious acid).

Action.—Laxative, parasiticide. **B.P. Dose.**—20 to 60 grs.

OFFICIAL PREPARATIONS.

1. **Confectio Sulphuris.**—1 in 2¼. **B.P. Dose.**—60 to 120 grs.
2. **Unguentum Sulphuris.**—1 in 10. Made with adeps benzoata.

NON-OFFICIAL PREPARATIONS.

1. **Confectio Guaiaci Composita. L.H.** *Syn.—Chelsea pensioner.* —Guaiacum, 2 ; sublimed sulphur 3, magnesium carbonate 2, ginger 1, treacle, by weight, 12. *Dose.*—1 to 2 drs. (*See also p. 240*).

2. **Unguentum Sulfuratum, P. Aust. Add.**—Soft soap 60, suet 30, sublimed sulphur 30, prepared chalk 5, tar 30.

3. **Unguentum Sulphuris c. Hydrargyro, U. C. H.**—Sublimed sulphur 30, mercuric sulphide 2, ammoniated mercury 2, olive oil 12, lard 54, creasote 5 ms. In **scabies**, and **skin-diseases of doubtful origin.**

4 **Unguentum Sulphuris Hypochloritis.**—Sublimed sulphur 12, essential oil of almonds 2, prepared lard 84, sulphur chloride 2. *Keep in stoppered bottle.* Used in **acne, psoriasis,** and **scabies.**

SULPHUR PRÆCIPITATUM.

Precipitated Sulphur.

Syn.—*Milk of Sulphur.*

Source.—By boiling sulphur with slaked lime and water, filtering, and then reprecipitating the sulphur by hydrochloric acid.

Characters.—A smooth, not gritty, powder of a greyish color, with only a slight tinge of yellow. *Impurity.*—Calcium sulphate, due to sulphuric acid being used instead of hydrochloric acid, which is more expensive.

Tests.—Should not be gritty, or show crystals of sulphate under the microscope. Should volatilise completely by heat, leaving no residue. **B.P. Dose.**—20 to 60 grs.

OFFICIAL PREPARATION.

1. **Trochisci Sulphuris.** *Syn.—"Garrod's lozenges."*—Precipitated sulphur 5 grs., acid potassium tartrate 1 gr., in each lozenge.

NON-OFFICIAL PREPARATIONS.

1. **Jephson's powder.**—Precipitated sulphur 2, guaiacam 1. For **tonsillitis, acne** and **constipation.** *Dose.*—60 grs.
2. **Pastillus Sulphuris Compositus.**—Pastils having the same composition as the lozenges, but with a basis of glyco-gelatin.

PHARMACOLOGY.

Externally.—When applied to the whole skin, pure sulphur has no effect but, if it be mixed with any greasy substance, some of it is converted into sulphuretted hydrogen which acts as a mild irritant, causing dilatation of the vessels and, in delicate skins, sometimes even eczema. It is a **parasiticide**, and rapidly causes the death of the **itch-insect.** When it is brought into contact with living protoplasm, sulphurous and sulphuric acids are formed : it therefore is a violent irritant to raw snrfaces, and it destroys fungi and low forms of vegetable life. This action is made use of in protecting the vines from the fungus which causes the **vine-disease** in Italy.

Internally. **Gastro-intestinal tract.**—Being insoluble in the fluids of the mouth, sulphur has no taste, neither does it undergo any change in the stomach. When however it reaches the small intestine, it comes in contact with the alkaline bile and a small portion, being converted into an alkaline sulphide, is absorbed as such, but the greater portion passes unchanged through the bowels and is excreted with the fæces. The amount absorbed depends on the preparation used, and Buchheim has shown that as much as 46 p.c. of the finely divided precipitated sulphur can be detected in the urine, but only 15 p.c. of sublimed sulphur is eliminated in this way. In the intestine, sulphur acts as a **mild laxative**, causing soft motions without as a rule any colic. *There are three theories as to the manner in which this drug acts on the bowel.*—(1) That the alkaline sulphides and sulphuretted hydrogen both stimulate the peristaltic action of the bowel and increase the secretion of intestinal juice. (2) That the sulphuretted hydrogen, being generated under pressure, forces the fæces in front of it in the same way that the cork is driven out of a pop-gun. (3) That the gritty particles of sulphur act as a mechanical stimulus to the muscular coats of the intestines. It is probable that both of the first two theories are correct ; there is no doubt that much sulphuretted hydrogen is generated in the bowels when a patient is taking sulphur, and this constitutes the chief objection to its use, as the smell of the gas is very offensive. Against the third theory is the fact that precipitated sulphur, which is not gritty, is the more effectual purgative of the two.

Remote effects.—Sulphur is said to **increase the secretion from the mucous membrane of the bronchial tubes** of healthy persons ; also to **increase the frequency and force of the heart's contractions**, and to **promote the flow of perspiration** : this however is doubtful. It is absorbed into the blood as sulphides and sulphuretted hydrogen which is a powerful poison, first reducing and then decomposing hæmoglobin : it thus **causes internal asphyxia.** It also acts as a **paralyser of the nervous and muscular systems.** Sulphur is never given internally in sufficiently large doses to produce these remote effects, but it is probable that many of the obscure nervous symptoms that accompany certain forms of dyspepsia and constipation, and which are called "*auto-intoxication*," are due to the development of sulphuretted hydrogen in the bowel and its subsequent absorption into the blood. Sulphur is excreted chiefly as sulphates by the urine, and as sulphuretted hydrogen by the lungs, skin, and milk. It gives an offensive smell to the breath, and blackens silver ornaments that are worn next the skin. Seeing that sulphur exists in large quantities in the bile, some observers maintain that it is a restorative in those conditions which are marked by a deficiency of that fluid, and which are known as "*acholia*". It has no effect on albuminous waste.

THERAPEUTICS.

Externally.—Sulphur is chiefly used in the treatment of **scabies** or itch. The patient should be instructed to scrub the skin well with soap and water at bedtime, then rub in the ointment and sleep in flannel garments. He may wash off the ointment when he rises in the morning. In this way, itch can be cured in a few days. When the cure is complete, the patient must be warned to change his linen, and have it thoroughly disinfected to destroy any eggs of the parasite that may remain in it. On account of the irritation caused by sulphur and its disagreeable smell, some physicians substitute storax for it in the treatment of this disease.

If scabies be **complicated by eczema and impetigo**, the best preparation to use is the Unguentum Sulfuratum P. Aust. Addend., the various constituents of which act as follows,—(1) the chalk mechanically breaks up the dead skin and opens up the burrows of the parasite, (2) the tar cures the eczema, and (3) the alkali in the soap checks the weeping from the raw surface. This ointment, accompanied by the use of the warm bath, is applied twice daily, and cures in three days.

For the cure of **acne**, a lotion, consisting of sulphur 1 dr., glycerin 1 oz. in 10 ozs. of rose-water, should be substituted for the ointment which is a very unsightly application to the face. Some of the severer forms of acne, however, will only yield to the Unguentum Sulphuris Hypochloritis. As an insufflation or dusting-powder, sulphur is said to be of value in **diphtheria**, and great relief is often obtained in **rheumatism and sciatica** by rubbing the affected limbs with sulphur and then applying flannel bandages.

Internally.—Sulphur is largely used as a laxative in **hæmorrhoids** and **fissure of the anus**, in which case it not only acts as a purgative, but it also has a direct soothing effect on the hæmorrhoidal vessels. Equal parts of the confections of senna and sulphur is a favorite prescription. Too long use of this drug leads to dyspepsia and catarrh of the bowels. It is given in **plumbism** to prevent reabsorption of lead from the intestines. In the form of "Chelsea Pensioner" it is a favorite remedy for **chronic rheumatism and gout**. In olden days the disciples of Hippocrates employed it largely in the treatment of **asthma**, and many modern physicians consider it of value as a remedy for **chronic bronchitis**, for which purpose it may be given in the form of the Spanish onion, which should be well boiled and eaten at bed time. Formerly rectal injections of sulphuretted hydrogen were administered in **phthisis**, but this practice has fallen into disuse. It is beneficial in many chronic skin diseases, as **psoriasis**, **impetigo**, **eczema**, and **acne**, and it acts as a sedative to the nervous system in **many troubles of the menopause**.

Prescribing hints.—The confection even when freshly prepared, is a very nauseous compound, and, when it is old, it sets into a hard mass like plaster. The lozenge is the most elegant method of administration to better class patients, and, if for any reason the use of sugar is inadvisable, the pastils may be substituted. To children sulphur is best given in the form of the compound liquorice powder, or it may be suspended in milk, honey or marmalade.

CALX SULPHURATA. Sulphurated Lime.

See page 296.

POTASSA SULPHURATA. Sulphurated Potash.

Syn.—*Liver of Sulphur.*

Source.—By heating together sulphur and carbonate of potash.

Characters.—Solid, dull-green fragments, liver brown when freshly broken, reaction alkaline, taste acrid.

Composition.—It is a mixture of salts, chiefly potassium sulphides.

Dose.—2 to 10 grs. **Action.**—Antiparasitic, and narcotic.

Non-Official Preparation.

1. **Unguentum Potassæ Sulphuratæ.**—1 in 80, [made with hard and soft paraffin.

SULPHURIS IODIDUM. Sulphur Iodide. SI.

Source.—Sublimed sulphur and iodine are fused together.

Characters.—Greyish-black crystalline masses, smelling like iodine. *Solubility.*—Insoluble in water, soluble 1 in 60 of glycerin.

OFFICIAL PREPARATION.

1. **Unguentum Sulphuris Iodidi.**—1 in 25, made with Adeps Benzoata.

Dispensing hint.—Unguentum Sulphuris Iodidi must be very carefully prepared, as, unless the iodide be very finely powdered, small craggy masses will remain, which will cause severe irritation of the skin.

PHARMACOLOGY OF THE ALKALINE SULPHIDES AND SULPHUR IODIDE.

Externally.—All are **irritants** and **parasiticides.** Strong solutions of the soluble potassium salt excite active inflammation of the skin; weak solutions stimulate it, causing **dilatation of the cutaneous vessels** and **diaphoresis.**

Internally.—Nothing is known of the action of sulphur iodide. The alkaline sulphides possess the same action as sulphuretted hydrogen, to which they owe their virtues. They **decompose the blood,** producing asphyxia, and they **paralyse the nervous and muscular systems.** Large doses give rise to **narcotic symptoms and convulsions.** They are partly decomposed by the acids in the stomach, giving rise to disagreeable eructations of sulphuretted hydrogen. In small doses they merely cause a sensation of warmth in the epigastrium, and determine **gentle relaxation of the bowels,** but large doses set up **gastro enteritis.** All the sulphides possess the power of **arresting and preventing suppuration**: they also have **a tonic effect on mucous membranes.** The constant inhalation of air impregnated with sulphuretted hydrogen **causes anæmia** and much functional depression.

THERAPEUTICS OF THE ALKALINE SULPHIDES AND SULPHUR IODIDE.

Externally.—Unguentum Potassæ Sulphuratæ may be used as a substitute for sulphur ointment in the treatment of **scabies,** but a better preparation is the Lotio Calcis Sulphurati, or **Vleminckx' solution,** which according to Bourguignon will cure the disease in half an hour (see page 296).

In the form of a bath (4 ozs. to 30 gallons of water) sulphurated potash is used in **chronic psoriasis, chronic rheumatic arthritis** and **myalgia, chronic nervous diseases,** and as **a diaphoretic in albuminuria.** These baths are also said to promote the elimination of the poison from the system in **plumbism** and **hydargyrism,** whilst the combination of sulphide baths with the internal administration of mercury constitutes the celebrated "**Aix" treatment for syphilis,** as practised at Aix la Chapelle. Unguentum Sulphuris Iodidi is the best preparation we possess for the cure of **acne rosacea, acne indurata,** and the **bromide and tar-acnes** Instead of using artificially-prepared baths, it is best wherever possible to resort to the natural mineral springs which contain alkaline sulphides. The best-known are :—*Harrowgate* in England, *Strathpeffer* in Scotland, and *Baréges* and *Aix la Chapelle* in France ; whilst in India the sulphur springs at *Bhajji* near Simla have a great local reputation. An excellent imitation of the Baréges waters may be made by combining sodium sulphide, sodium carbonate, and sodium chloride in the proportion of 20 grs. of each to every gallon of water.

Internally.—The natural sulphurous waters are specially useful in **follicular pharyngitis** and are much resorted to by public singers in Europe. They also increase both the secretion of bile and the amount of solids in it, on which account they are highly esteemed in the treatment of all **hepatic disorders.** The two sulphides are useful in **boils, carbuncles,** and **scrofulous glands.** Calx Sulphurata (which see) is the better preparation, but Potassa Sulphurata may also be used for this purpose. The latter drug has also been given in **chronic bronchitis, croup,** and **whooping cough,** and *as a rectal injection* for the destruction of *Oxyurides.*

Prescribing hints.—Sulphide baths must always be given in porcelain or wooden vessels, as the salt attacks and discolors metals. Remember that these baths have the offensive smell of rotten eggs, and that you must therefore be careful how you prescribe them for delicate or fanciful patients.

SUMBUL RADIX. Sumbul Root.

N. O. *Umbelliferæ.*

Syn.—*Musk root.*

Habitat.— Russia and India.

Source.—The dried transverse sections of the root of *Ferula sumbul.*

Characters.—Cylindrical pieces, ¾ to 1 in. thick, varying considerably in diameter. Covered on the outer edge with a dusky brown rough bark, beset with short bristly fibres. Cut surface felt-like, coarsely fibrous, dirty yellowish brown, mottled with spots of exuded resin. Smell like that of musk. Taste at first sweetish and aromatic, afterwards bitter.

Resembles.—Calumba, but distinguished by its porous texture and musk-like smell.

Composition.—(1) A volatile oil. (2) Two resins. (3) *Valerianic acid.* (4) *Angelic acid.* (5) *Sumbulic acid.*

Action.—Nervine stimulant, and antispasmodic.

OFFICIAL PREPARATION.

1. **Tinctura Sumbul.**—1 in 10. Made with *fresh* root. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Its action resembles that of the other volatile oils : it is an **antispasmodic**, and may be given for the relief of **flatulence**. It is supposed to be a **nervine tonic**, resembling valerian and musk, and on that account it has been used in the treatment of **hysteria, neurotic conditions, adynamic fevers, dysentery, diarrhœa, asthma, delirium tremens** and **epilepsy**, but it is probably of very little use and will doubtless disappear from the next edition of the B. P.

TAKA DIASTASE. *(Non-official.)*

Syn.—Koji. **Habitat.**—Japan.

Source.—A ferment produced by a fungus, *Aspergillus Oryzæ*, on heated rice. It may also be cultivated on bran.

Characters.—A yellowish white powder, which changes in a few minutes a hundred times its weight of starch into maltose.

Action.—Amylolytic. *Dose.*—2 to 5 grs. in wafer.

PHARMACOLOGY AND THERAPEUTICS.

It is very valuable in all forms of **starchy dyspepsia with hyperacidity**, such as are so common amongst the rice-eating inhabitants of Bengal, and it will be found *preferable to pepsin in all cases of this kind.* It may be combined like papain with sodium bicarbonate, and it shares with this drug the advantage that, being a purely vegetable product, it may *be given without offence to the strictest Hindoos and Mahomedans.*

TAMARINDUS. Tamarinds.

N. O. *Leguminosæ.*

Habitat.—West Indies.

Source.—The pulp of the fruit of *Tamarindus indica*, preserved in sugar.

Characters.—A reddish brown, moist pulp, containing strong fibres, and brown shining seeds, each enclosed in a membranous coat. Taste agreeable, sweetish, subacid. *Impurity.*—Copper.

Tests.—A piece of bright iron, left in contact with the pulp for an hour, should show no deposit of copper.

Composition.—(1) *Tartaric acid* and *potassium tartrate.* (2) *Citric, acetic*, and other acids. (3) *Grape sugar.*

Enters into.—Confectio Sennæ, 9 in 75.

Action.—Laxative, refrigerant. **B.P. Dose.**—½ oz. and upwards.

PHARMACOLOGY AND THERAPEUTICS.

As a refrigerant, tamarind whey (tamarind 1, milk 30) is given as a drink in **fevers**. It is a mild laxative, and when spread on bread and butter forms a **pleasant purgative for children**.

TARAXACI RADIX. Taraxacum Root.

N. O. *Compositæ*.

Habitat.—England.

Source.—The dried and fresh roots of *Taraxacum officinale* (*T. Dens-leonis*). Collected in the autumn.

Characters.—Tap shaped roots, which, when fresh, are smooth and yellowish, brown externally, white within, and giving out a bitter inodorous *milky juice*. When dried, the root is dark-brown, shrivelled, and furrowed longitudinally. Taste bitter. *Impurity*.—Common hawkbit, fraudulently mixed.

Identification.—Resembles Pellitory, which is not bitter and causes a tingling sensation to the tongue when chewed.

Tests.—Hawkbit is wrinkled and pale colored externally, and has a *watery* juice.

Composition.—(2) *Taraxicin*, a neutral principle. (2) *Taraxacerin*. (3) *Asparagin*, of no therapeutical value. (4) *Inulin*, *mannite*. (5) A considerable quantity of *potassium* and *calcium salts*. (6) *Resins*, to which the milky appearance of the juice is due.

Action.—Diuretic, laxative, tonic, and feeble cholagogue.

OFFICIAL PREPARATIONS.

1. **Extractum Taraxaci**.—Made with *fresh root*. **B.P. Dose**.—5 to 15 grs.
2. **Ext. Taraxaci Liquidum**.—Made with *dried root*. **B.P. Dose**.—½ to 2 drs.
3. **Succus Taraxaci**.—Alcohol (90 p.c.). **B.P. Dose**.—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

The fresh juice, or even an infusion prepared from the fresh root, has decidedly **tonic** effects, somewhat resembling those of Calumba ; it is also slightly **laxative**, but it is extremely doubtful whether the preparations obtainable from the chemists' shops have any therapeutic effect whatever. This drug is very little used now-a-days, and it has lost its reputation as a **cholagogue** and **diuretic**.

TEREBENUM. Terebene.

Source.—Obtained by the action of sulphuric acid on turpentine, and subsequent distillation.

Characters.—A colorless liquid, with a pleasant pine-wood odor. Should not affect the plane of polarised light. Sp. gr. 0·862 to 0·866. Is not miscible with water, but may be emulsified by mixing with one-sixth its weight of tragacanth, then adding water and shaking well.

Composition.—A mixture of *dipentene* and other hydrocarbons.

Dispensing hint.—The official terebene must not be confounded with a dark-colored liquid, which is sold under a similar name as a cheap disinfectant. This preparation is a useful deodoriser for the sick-room but does not permeate decomposing substances, as it is not soluble in water : it is therefore of little value as a disinfectant.

Action.—Antiseptic, stimulating expectorant. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Capsules**, containing 5 and 10 minims.
2. **Haustus Terebeni. Vict.** *Park.*—Terebene 10 ms., mucilag. tragacanth. 1 dr., glycerin 1 dr., cinnamon water 1 oz.
3. **Mistura Apomorphinæ et Terebeni.**—Apomorph. hydrochlor. $\frac{1}{10}$ gr., terebene 15 ms., balsam of Peru 10 ms., mucilag. acaciæ 2 drs., syrup 30 ms., water to 1 oz. *Dose.*—1 oz.
4. **Vapor Terebeni, T. H.**—Terebene 40 ms., magnes. carb. levis 20 grs., water to 1 oz. A teaspoonful of this in a pint of water at 140°F. as an inhalation.

PHARMACOLOGY AND THERAPEUTICS.

As a *stimulating expectorant*, it has been given by Murrell with success in **chronic bronchitis and winter-cough,** especially when complicated with **emphysema.** It may be exhibited in various ways :—(a) *Externally*,—either as an inhalation in the form of the Vapor, or 15 to 30 drops may be sprinkled on the cotton-wool of an antiseptic respirator, or it may be used as a spray. (b) *Internally*,—as a mixture, either alone or combined with apomorphine and other expectorants ; or five drops may be taken a few times a day on a lump of sugar, or in capsules or thick syrup.

As an *antiseptic and sedative*, the vapour of terebene is useful in **phthisis,** in which disease it is usual to combine it with equal parts of phenol and thymol, or phenol and spirits of chloroform, and use 10 drops of this mixture for medicating the antiseptic respirator. It should at the same time be given internally, as the terebene destroys the bacilli of the swallowed sputa and lessens the risk of tubercular infection of the bowels. Terebene acts on the mucous membrane of the urinary and gastro-intestinal tracts in much the same way as turpentine and it is said to be of value in **dysentery.**

Betrin reports that plugs of wool soaked in terebene give splendid results when applied to **epitheliomata of the cervix uteri.**

Prescribing hint.—Terebene must be given with caution to gouty patients who are the subjects of chronic kidney troubles, as it may increase the albuminuria in cases of this kind.

TEREBINTHINA CANADENSIS. Canada Turpentine.

N. O. *Coniferæ.*

Syn.—*Canada balsam. Balsam of fir*, U. S. P.
Habitat.—Canada.
Source.—An oleo-resin obtained from *Abies balsamica.* (Balm of Gilead fir.)
Characters.—A pale yellow, transparent fluid, resembling thin honey. Odor pleasant, characteristic. Taste bitterish. Dries slowly, forming a clear varnish. *Solubility.*—In ether, chloroform, and spirit.
Composition.—(1) An essential oil, isomeric with oil of turpentine, and (2) various resins.
Dose.—20 to 30 grs. **Enters into.**—Collodion flexile.

PHARMACOLOGY AND THERAPEUTICS.

Its action is the same as that of oil of turpentine, but it is only used for its physical properties, and in the preparation of microscopic specimens. It may however be given internally as a stimulant to mucous membranes, and it has occasionally been prescribed (in the form of a pill with magnes. carbonate) for **gleet** and **chronic gonorrhœa.**

TEREBINTHINÆ OLEUM. Oil of Turpentine.

N. O. *Coniferæ.*

Habitat.—England, America, France, and Russia.
Source.—An oil distilled by the aid of steam from the oleoresin (common turpentine) which exudes from *Pinus sylvestris* and other species.
Characters.—Limpid, colorless, with a strong, characteristic odor and a pungent taste. Neutral. Mixes with other oils. Dissolves wax, sulphur, phosphorus, iodine, and resins (forming varnishes). Easily oxidised. Old oil of turpentine is an ozonizing agent and may be used as a test for blood. The English, American, and Russian oils deflect the ray of polarised light to the right, but the French oil is lævo-rotatory. *Solubility.*—Insoluble in water; soluble 1 in 6½ of alcohol (90 p.c.), 3 in 10 of ether, and in all proportions of absolute alcohol, chloroform, and carbon disulphide.
Composition.—(1) Several *terpenes*, all having the formula $C_{10}H_{16}$, the chief being *pinene*, *phellandrene*, *limonene*, and *dipentene.* (2) *Sesquiterpenes*, $C_{15}H_{24}$. (3) *Bornyl acetate.*
Note.—Many official volatile oils contain various terpenes, all isomeric and all having the same general formula $C_{10}H_{16}$. Camphor and Sanitas are both products of the oxidation of a terpene.
Dispensing hint.—In order to emulsify turpentine it is necessary to rub it up thoroughly with twice its bulk of mucilage.
Action.—Rubefacient, stimulant, diuretic, anthelmintic, cathartic.
B.P. Dose.—2 to 10 ms.; or 3 to 4 drs. as an anthelmintic.

OFFICIAL PREPARATIONS.

1. **Linimentum Terebinthinæ.**—13 in 20, made with camphor, soft soap and water.

2. **Linimentum Terebinthinæ Aceticum.**—1 in 2.

NON-OFFICIAL PREPARATIONS.

1. **Terpinum Hydratum.** *Syn.—Terpine.*—A derivative of oil of turpentine, in prismatic crystals, resembling chloral hydrate. Soluble in water 1 in 250, alcohol 1 in 10. Should have no odor of terebene. Used in bronchitis, phthisis, hæmoptysis and as a diuretic. *Dose.*—2 to 6 grs. in cachet, pill or suspended.

2. **Terpinol.**—An agreeable aromatic liquid, obtained by the action of dilute sulphuric acid on terpene. *Dose.*—1 to 5 ms., given during meals.

PHARMACOLOGY.

Externally.—When rubbed into the skin, it is **rubefacient, irritant,** and **counter-irritant,** and later on a **local anæsthetic.** In large amounts, it is a **vesicant.** It is also **antiseptic** and **disinfectant,** and it is absorbed by the unbroken skin.

Internally. **Gastro-intestinal tract.**—In the stomach it causes dilatation of the gastric vessels, and increases both the peristaltic movements and the secretion of gastric juice : at the same time it **reflexly stimulates the heart,** but on account of its sickening taste it is never used for this purpose, as other volatile oils act equally well and are not so nasty. In the intestines, it causes powerful peristaltic movements and expulsion of flatus : it is therefore a strong **carminative.** In large doses it causes great vascular dilatation and **purging** ; the stools containing large quantities of blood. In doses of 2 to 4 drs. it is an **anthelmintic,** killing the **tape-worm,** but this treatment is too dangerous for adoption. As an enema, it kills **Oxyurides.**

Circulation.—Is is readily absorbed, and then acts as a **direct stimulant to the heart,** increasing both the force and the frequency of its beats. It at first causes contraction of the small vessels, and is therefore a **hæmostatic.** It causes a rise and then a fall of blood-pressure, due to its first stimulating and then paralysing the vasomotor centres. Its action on the pulse varies : sometimes it is quickened and sometimes slowed.

Respiration.—When inhaled it produces sneezing, a tight feeling across the eyes, and dyspnœa, due to reflex irritation from the action on the nasal mucous membrane. It directly irritates the bronchial mucous membrane, causing dilatation of the vessels, increase of secretion, and stimulation of the muscular coats of the bronchi, whilst reflexly it excites cough. At the same time it increases the activity of the respiratory movements, and is therefore a **powerful expectorant.** If the secretion is purulent, it is disinfected. When taken internally, turpentine is excreted by the bronchial mucous membrane, and has a similar action to that already described.

Nervous system.—Large doses cause **languor, hebetude drowsiness,** and **unsteadiness of gait.** Toxic doses are followed by **coma** and **paralysis of the sensory nerves,** with abolition of reflex action.

Kidneys.—Here its action is especially powerful. Comparatively small doses may cause **lumbar pain, scanty urine, albuminuria,** and **hæmaturia,** with all the symptoms of **strangury.** After a large dose there may even be complete **suppression of urine.** The urine has a **smell of violets.**

Skin—It is excreted by the skin, and sometimes causes **erythema.**

Temperature.—Turpentine is said to be a mild **antipyretic,** but occasionally it has the very opposite effect. Old oil of turpentine is an antidote to phosphorus (see p. 532).

THERAPEUTICS.

Externally.—Turpentine *stupes* (flannels wrung out of very hot water and sprinkled with turpentine) are largely used to produce **irritant** or **counter-irritant** effects in various forms of **acute** and **chronic inflammation,** such as **peritonitis, pleurisy, bronchitis,** and **osteoarthritis.** The liniments are valuable applications to painful areas, as in **neuralgia, myalgia, rheumatism, lumbago,** and **unbroken chilblains.** Pure turpentine has been used as a **parasiticide** in the various forms of Tinea, and Faulis recommends the following plan, which he claims will cure **ringworm** in a week :—"Cut the hair and rub in turpentine until smarting is complained of, then wash with carbolic soap (1 in 10), dry the skin and paint on 2 or 3 coats of Tr. Iodi. Finally anoint the hair with carbolic oil (1 in 20)." Turpentine may also be used for the cure of **psoriasis** in cases where chrysophanic acid causes too much irritation. For this purpose the scales must first be removed by alkaline baths, and then a mixture of turpentine and olive oil (1 in 4) painted on. Afterwards gradually increase the proportion till the pure oil is used. On account of its property of constricting the vessels, turpentine is strongly recommended by Jacobson as a **hæmostatic** to check the free oozing that follows **removal of the jaw, excision of the tongue,** and many **operations about the mouth,** in which cases its antiseptic properties are also of value. The vapor also checks the bleeding in **hæmoptysis,** but the air of the patient's room must be saturated with it.

Note.—"Sanitas" fluid (see p. 442) is merely a watery solution of common turpentine which has been allowed to oxidise in the air. It is a pleasant non-poisonous disinfectant, and does not stain linen.

Internally. **Gastro-intestinal tract.**—In large doses (30 to 60 ms every hour for a few hours) it is a valuable **hæmostatic** in **gastric ulcer, typhoid fever,** and **dysentery** ; whilst, as an enema, it is very efficacious in relieving **tympanitic distention of the abdomen.** It has both a prophylactic and curative action in cases of **hepatic colic** (turpentine 1, ether 3), and may even cause the solution of small calculi in the gall-bladder. Its use as an **anthelmintic** has already been described.

Circulation.—By reducing blood-pressure, it acts as a hæmostatic in **hæmoptysis,** but it should not be given in **hæmaturia** except in very small doses. It is invaluable in the hæmorrhages that accompany the **hæmorrhagic diathesis** and **purpura.**

Respiratory tract.—With the exception noted above, it is not much used as an inhalation, as Pumiline, Terebene, and Eucalyptus oil are much more pleasant and less irritating. Given internally in small doses it is useful in **chronic bronchitis,** but terpine hydrate and terpinol are to be preferred. *(N. B.—Terpinol must not be confounded with Terpincol, which is a thick colorless alcohol contained in it, and sometimes used to disguise the smell of iodoform).*

Genito-urinary system.—It has been given with benefit in **simple catarrh of the bladder, chronic cystitis, gonorrhœa,** and **gleet** ; also, as a diuretic, in **hepatic dropsy.**

Skin.—Its internal use has been recommended in **eczema, psoriasis,** &c., where it acts by constricting the capillaries ; for the same reason it is said to do good in **iritis** and **non-specific choroiditis.**

Caution.—Turpentine must always be given cautiously on account of its liability to set up strangury, and *it should never be given at all to the subjects of Bright's disease,* as in cases of this kind it may cause fatal suppression of urine.

TEREBINTHINA CHIA. Chian Turpentine.

N. O. *Anacardiaciæ.* (*Non-official*).

Habitat.—Chio.

Source.—An oleo-resin obtained from the incised trunk of *Pistacia Terebinthus.*

Characters.—In solid tears, with an agreeable smell and taste, free from the bitterness and acridity of pinaceous turpentines. Both in taste and appearance, it resembles Mastiche which is obtained from *Pistacia lentiscus.*

Dose.—5 to 10 grs.

NON-OFFICIAL PREPARATIONS.

1. **Mistura Terebinthinæ Chiæ.**—Pulv. acaciæ 5, Pulv. tragacanth. 1, Chian turpentine 5, ether 5, distilled water *q.s.* to 70. Triturate the three powders in a dry mortar, dissolve the turpentine in the ether, and mix with the powders ; then add boldly water 10, and triturate till emulsified, afterwards adding water 40. Stir until the ether has evaporated and then transfer to a dry bottle, finally adding water to 70.

Dose.—3 drs. daily, in divided doses, after food, gradually increased to 9 drs. Contains about 30 grs. in 1 oz.

2. **Pilula Terebinthinæ Chiæ.**—Chian turpentine 3, sublimed sulphur 2, to which a little Lycopodium may be added to preserve the shape. *Dose.*—Two every four hours.

3. **Pilula Terebinthinæ et Zinci.**—Chian turpentine 4, zinc sulph. 1. Make one pill. *Dose.*—1 to 3 pills.

PHARMACOLOGY AND THERAPEUTICS.

Chian turpentine was brought to the notice of the profession by Clay as a remedy for **cancer of the uterus**, in which disease he professed to have obtained marvellous results with this drug, but subsequent observations have shown that his statements are greatly exaggerated and many physicians have therefore discarded it altogether. The writer however, as the result of his personal experience, can vouch that it is of considerable value, and that although it does not cure the malady, it distinctly checks its progress, improves the general condition of the patient, and lessens the fetor of the discharges. It is best exhibited in the form of the mixture described above.

THEOBROMATIS OLEUM. Oil of Theobroma.

N. O. *Sterculiaceæ.*

Syn.—*Cacao Butter.*

Habitat.—Demerara and Mexico.

Source.—By expression from the warm ground seeds of *Theobroma cacao.*

Note.—*Chocolate* is prepared from these seeds by roasting the kernels and afterwards adding sugar and vanilla. *Cocoa* is prepared by first expressing a portion of the oil, and then roasting and grinding.

Characters.—A yellowish, solid concrete oil, in cakes, with the consistency of tallow and smelling like chocolate. Taste agreeable. Does not turn rancid on exposure to the air. Melts at 86° to 95°F.

Composition.—(1) *Stearin.* (2) *Olein.* (3) An alkaioid, *Theobromine.*

Enters into.—All suppositories except those of glycerin.

PHARMACOLOGY AND THERAPEUTICS.

Because its melting-point is below that of the human body, oil of theobroma is used as the basis for all suppositories which are intended to slowly dissolve when introduced into the rectum.

Ichthyol suppositories require the addition of a little beeswax to give them consistency.

NON-OFFICIAL PREPARATIONS OF THEOBROMINE.

1. **Diuretin.**—A *sodio-salicylate of theobromine*, which is closely allied to caffeine (theobromine is *di-methyl xanthine*, and caffeine is *tri-methyl xanthine*). A white powder, freely soluble in water, and

containing 40 p.c. of theobromine and 60 p.c. of sodium salicylate. It is a valuable diuretic in **cardiac** and **renal dropsy**. Is stronger than caffeine, its effects last longer, toleration is not easily established, and it is less likely to cause insomnia. It however often causes diarrhœa and sometimes vomiting. Is said not to cause much depression, but serious effects have been known to follow three doses of 15 grs. each. *Dose.*—5 to 15 grs.

2. **Iodo-theobromine.**—*Sodio-theobromine iodide*, containing 40 p.c. of theobromine in combination with sodium iodide and salicylate. Recommended in **cirrhosis of the liver**, and **acute nephritis**. *Dose.*—2 to 10 grs.

3. **Uropherin.** *Syn.*—*Lithium-diuretin.*—A combination of lithium salicylate with theobromine-lithium. A diuretic, with little action on the heart. This is salicylic uropherin; a similar benzoic uropherin is also made. *Dose.*—5 to to 15 grs. (See also p. 474).

THUS AMERICANUM. Frankincense.

N. O. *Coniferæ.*

Habitat.—Southern United States.

Source.—An oleo-resin scraped off the bark of *Pinus palustris* and *Pinus tæda.*

Characters.—Soft, yellow, opaque, tough solid, becoming darker, dry, and brittle by keeping. Smells and tastes like turpentine.

Composition.—As other oleo-resins. **Action.**—External stimulant.

Enters into.—Emplastrum Picis.

PHARMACOLOGY AND THERAPEUTICS.

It is not used internally, but is added to plasters on account of its mild stimulating effects and for its physical properties.

THYMOL. Thymol. $C_6H_3.OH.CH_3.C_3H_7$.

Habitat.—Britain and Asia.

Source.—A crystalline substance extracted with caustic soda from the volatile oils of *Thymus vulgaris* (N. O. *Labiatæ.*), and *Carum copticum* (N. O. *Umbelliferæ.*). Purified by recrystallisation from alcohol.

Characters.—Large prismatic crystals, smelling like thyme, and with a burning, nauseous, aromatic taste. They sink in cold water, but melt and rise to the surface if the water be heated. *Solubility.*—1 in 1500 of cold water, 1 in 190 of glycerin, 1 in 2 of olive oil. Freely in alcohol, ether, and chloroform.

Composition.—It is a *phenol*, and exists in oil of thyme in combination with *cymene.*

Dispensing hints.—Thymol when rubbed with an equal weight of menthol, camphor, or phenol forms an oily liquid (*see Menthol*). When three parts of thymol are rubbed with two parts of chloral hydrate, a similar liquefaction take place.

Action.—Antiseptic, parasiticide and deodorant.

B.P. Dose.—½ to 2 grs., in pill.

NON-OFFICIAL PREPARATIONS.

1. **Liquor Thymol**.—1 in 800 of warm water.

2. **Ophthalmic discs**, each containing $\frac{1}{1000}$ gr. of thymol.

3. **Pastillus Thymol**, each containing $\frac{1}{32}$ gr. of thymol.

4. **Spiritus Thymol**.—1 in 10, with alcohol (90 p.c.). *Convenient for dispensing* and for *medicating the wool of antiseptic respirators. Dose.*—3 to 15 ms.

5. **Thymol Gauze**, containing 1 p.c. of thymol. As an *antiseptic dressing.*

6. **Volckman's Thymol Solution**.—Thymol 1, alcohol 20, glycerin 20, dissolve and add to water 1000. As a *spray*, and *antiseptic lotion.*

7. **Unguentum Thymol**.—In varying strengths from 5 to 30 grs. in 1 oz. of vaseline. The thymol must be dissolved in the basis by the aid of heat. 10 grs. to 1 oz. of vaseline is very useful **for keeping off mosquitoes**.

8. **Vapor Thymol**.—Thymol 6 grs., rectified spirit 1 dr., magnesium carbonas levis 3 grs., water to 1 oz. As an *inhalation.*

9. **Thymol Carbonate**. *Syn.—Thymotal.*—Is not dissolved in the stomach, and therefore valuable as a remedy for **anchylostoma**. *Dose.*—5 to 15 grs.

PHARMACOLOGY AND THERAPEUTICS.

Thymol is a very powerful antiseptic : a solution of the strength of 1 in 1000 stops all putrefactive of fermentative action in any fluid to which it is added. It is therefore more powerful than carbolic acid : it is also less apt to cause eczema, but its insolubility is a great drawback to its use. Volckman's solution, the gauze and the ointment are all employed in **antiseptic surgery** and the last mentioned is very useful in **parasitic skin diseases**, especially **tinea of the scalp or beard**. **Burns**, washed first with a watery solution ($\frac{1}{2}$ gr. in 1 oz.) and then treated with on oleaginous solution ($\frac{1}{2}$ gr. in 1 dr.), heal rapidly. The pastiles, spray and inhalation are useful in **laryngitis** and **pharyngitis**, and the solution may be employed as a lotion in **chronic eczema**, **ozœna**, and **psoriasis** ; or as an injection in **leucorrhœa**.

Internally.—In large doses, thymol gives rise to very unpleasant symptoms, excitement, vertigo &c., and the urine may become dark as in carbolic acid poisoning. In still larger doses the medullary and spinal centres are paralysed, collapse sets in, and there is a marked fall of blood-pressure and temperature before death. Its internal administration has been recommended in **typhoid fever**, **pleurisy**, **pneumonia**, **chronic cystitis**, and **diabetes**, whilst Bozzolo urges that it should be tried in **cholera**. Warren gives it in **diphtheria**, in combination with potassium chlorate, quinine, and brandy. Its chief value, however is as an anthelmintic for **anchylostoma duodenale**, for which purpose it must be given in doses of 15 to 30 grains, repeated 3 or 4 times at intervals of an hour. When giving the drug in these large doses, the patient must keep his bed and lie down for several hours after the last dose ; he must also be warned not to partake of alcohol or any other solvent of thymol as long as the drug is in his stomach, otherwise serious consequences may ensue. Thornhill relates an instance in which a fatal result was brought about, after two thirty grains doses, by the neglect of these precautions.

Prescribing hints.—Thymol *must never be administered in solution*, as it causes a most unpleasant burning sensation of the mouth and throat, and is extremely irritating to the mucous membrane of the stomach. It should be given in pill, cachet, or emulsion. The emulsion is best made by dissolving the thymol, in alcohol, and then precipitating it by pouring the alcoholic solution into **cold** water. A little mucilage may finally be added to keep the finely powdered thymol in suspension.

THYROIDEUM SICCUM. Dry Thyroid.

N. O. *Ruminantia.*

Source.—Prepared from the fresh and healthy thyroid of the sheep. The glands are taken from the sheep directly it is killed, all fat and connective tissue are removed, and the glands cut across. Any abnormal glands are rejected, and the healthy ones are minced, dried, powdered, and exhausted of fat by means of petroleum spirit.

Characters.—A light dull brown powder, with a faint meat like odor, but no smell of putrescence.

Composition.—A proteid, *Thyroiodin*, containing 9. 3 p.c. of iodine and 0. 5 p.c. of phosphorus. It exists in the colloid matter of the gland.

Dispensing hint.—It must be carefully preserved in dry stoppered bottles, as it will putrefy if it becomes damp.

Action.—Restorative in myxœdema and cretinism.

B.P. Dose.—3 to 10 grs.

LIQUOR THYROIDEI. Thyroid Solution.

Source.—A fresh healthy sheep's thyroid is sliced. To this add 34 ms. each of glycerin and phenol solution (0. 5 p. c.) Allow to stand for 24 hours, then strain, press, and add enough phenol solution to make it up to 100 ms.

Characters.—A pinkish turbid liquid, free from putrescence.

Dispensing hint.—It must be freshly prepared, and kept in well stoppered bottles which have been sterilised before the fluid is poured into them.

B.P. Dose.—5 to 15 ms. (100 ms. represents one gland).

NON-OFFICIAL PREPARATIONS.

1. **Iodothyrin.** *Syn.—Thyro-iodin.*—Prepared by extraction of the pancreatised gland by means of petroleum ether, solution in soda, and precipitation by sulphuric acid. *Dose.*—5 grs. (See p. 451).
2. **Thyrocoll.**—A similar preparation, isolated from the colloid material.
3. **Thyroglandin.**—A thyroid extract. *Dose.*—1 to 5 grs.

PHARMACOLOGY.

Externally.—Nil.

Internally. **Circulation.**—It causes **increase in the pulse-rate, palpitation** and **weakness of the heart's beat,** whilst, as a result of its action on the vaso-motor centres, there is a **fall of blood-pressure** and the **skin becomes warm** and **bathed in moisture.** There is an **increase in the number of lymphocytes** in the blood.

Excretion.—It is chiefly excreted by the kidneys, but large doses may cause **gastro-intestinal disturbances** and **diarrhœa.**

Metabolism.—Here it has a very marked effect, and it causes greatly increased oxidation of all the tissues, so that an excess of urea, uric acid and xanthin bases is excreted by the kidneys, and more carbonic acid by the lungs. Consequently the **temperature rises,** and although the appetite increases **the body-weight falls.**

Kidneys.—Thyroid is a **diuretic,** and may even cause **glycosuria.**

Nervous system.—Large doses sometimes cause **tremors, restlessness,** and **insomnia** ; and **mania** has been known to follow its use for the cure of obesity.

THERAPEUTICS.

Thyroid gland may be exhibited in four ways (1) by *feeding patients* with the lightly cooked glands, (2) by *grafting* pieces of the gland under the skin, (3) by *giving dry thyroid* in powders, cachets, or tabloids, or (4) by *giving thyroid solution.* The first two methods are now practically abandoned, and thyroid solution should always be used whenever possible as the dry thyroid is so apt to putrefy.

Its chief use is in the treatment of **myxœdema** which is a disease due to atrophy of the thyroid gland. Begin with 5 ms. three times a day, and gradually increase the dose until 10 ms. can be taken. In six weeks all symptoms will probably have disappeared, but to prevent recurrence the patient must take 10 ms. twice a week for the rest of his life. In the same way it acts like a charm in **cretinism,** which is a form of idiocy associated with dwarf growth, due to congenital absence of the thyroid. Under this treatment however the bones of cretins have a strange tendency to bend. Thyroid has also proved of benefit in **congenital imbecility, tetany,** and the **insanity of the menopause.**

Serafine extols the thyroid treatment in certain forms of **goitre,** especially in **struma parenchymatosa,** but it is useless in **exophthalmic goitre.** It has been successfully used in the cure of ordinary **obesity,** but it is dangerous and cannot be recommended for this purpose. Various skin diseases have been benefited by it, as **psoriasis, pityriasis rubra, ichthyosis, eczema, lupus** &c., whilst it sometimes causes a luxuriant growth of hair in **alopecia**.

Cheron uses it as a **galactagogue**, and in **threatened abortion**; and Gauthier reports successful results in the treatment of **ununited fracture**. Different observers have reported benefit from its use in **malignant syphilis, carcinomatous nodules** reappearing after operation, **acromegaly** and **leprosy**, and it is said to **assist the development of backward children**, and to control **hæmophilia**.

Iodothyrin and *thyrocoll*, which have been recently introduced, have not verified the claims made on their behalf. They are powerful alteratives, but they have very little value in cases where ordinary thyroid gland substance proves so efficacious. Iodothyrin acts powerfully on metabolism, and has the toxic properties of iodine.

TOXICOLOGY.

Acute Thyroidism.—The symptoms produced by an overdose are as follows :—rapid pulse, fever, headache, tendency to syncope, sickness, diarrhœa, restlessness, wandering pains, pruritus, and rarely delirium.

Chronic Thyroidism.—The symptoms are :—loss of weight, muscular weakness and paresis, falling out of the hair, protrusion of the eyeballs, dilatation of the pupils with widening of the palpebral fissure, and finally death from malnutrition and asthenia. It will be noted that these symptoms closely resemble those of exophthalmic goitre.

TINOSPORA. Tinospora.

N. O. *Menispermaceæ.*

(Ind. and Col. Addendum).

Syn. I. V.—*Gulancha*, Beng. Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried stem of *Tinospora cordifolia*, collected during the hot season.

Characters.—Cylindrical, straight or twisted pieces, or in transverse sections. Bark shrunken, longitudinally furrowed, and covered with round elevated scars, color greenish brown, not rough.

Composition.—(1) *Berberine.* (2) A non-crystallisable bitter glucoside. (3) A starch, known as *gilœ ka sat.*

Action.—A simple bitter.

OFFICIAL PREPARATIONS.

1. **Infusum Tinosporæ.**—1 in 10. **B.P. Dose.**—½ to 1 oz.
2. **Liq. Tinosporæ Concentratus.**—1 in 20. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Tinosporæ.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Tinospora has **tonic, antiperiodic, diuretic,** and **alterative** properties. It is a pure bitter without tannin, and may be **substituted for Calumba** in all cases in which that drug is indicated. It has a great reputation in India for the treatment of **mild intermittents,** the **debitity of convalescence, secondary syphilis,** and **chronic rheumatism.** Some even assert that in malarial fevers it is sometimes more efficacious than quinine. The fresh plant is given, mixed with milk, in **rheumatism, acidity of urine** and **dyspepsia.**

Gilœ ka sat, which is prepared by powdering the stem and extracting the starch with water, retains none of the bitterness of the drug. It is said to be an excellent remedy in **urinary affections** and **gonorrhœa,** and is also esteemed as a tonic **after fevers,** and in **splenic cachexia.** The dose is ½ to 1 dr., taken with sugar, milk or rice gruel.

TODDALIA. Toddalia.

N. O. *Zanthoxylleæ.*

(*Ind. and Col. Addendum*).

Syn. I. V.—*Kartodali* Beng., *Dahana* Sans., *Jungli kali mirch* Hind.

Syn. Commercial.—Lopez Root.

Habitat.—India and Eastern Colonies.

Source—The dried root bark of *Toddalia aculeata.*

Characters.—Quilled pieces, covered with soft yellowish periderm, fissured longitudinally, and exhibiting a bright yellow layer and a deeper brown layer. It has a faint aromatic odor and an aromatic pungent bitter taste.

Composition.—(1) A resin and an essential oil, having a cinnamon-like odor. (2) A bitter principle, probably an alkaloid, with antipyretic properties.

Action.—Aromatic tonic, carminative, antiperiodic (?).

OFFICIAL PREPARATIONS.

1. **Infusum Toddaliæ.**—1 in 10. **B.P. Dose.**—1 to 2 ozs.
2. **Liq. Toddaliæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Its pharmacological actions *resemble those of Cusparia* (*q. v.*), and it is largely used in the East as a **stomachic,** a **febrifuge,** and as a **seasoning for food**; also as a **carminative** in **dyspepsia** and **dysentery.**

It is also of value in **constitutional debility** and in **convalescence from febrile and exhausting diseases.**

The fruit and root, when rubbed down with oil, make an excellent stimulating application in **rheumatism.**

TRAGACANTHA. Tragacanth.

N.O. *Leguminosæ.*

Syn. Commercial.—Syrian Tragacanth.
Habitat.—Asia Minor.

Source.—A whitish gummy exudation obtained by incising *Astragalus gummifer* and other species of Astragalus.

Characters.—Horny curved plates of varying sizes and shapes, somewhat translucent and marked with concentric rings. Very tough, and must be heated to 120° F. before it can be powdered. Without smell or taste *Solubility.*—Sparingly in cold water which converts it into a gelatinous mass, colored violet by Tr. Iodi. *Impurities.*—Other gums.

Identification.—Resembles Scilla, which is thicker and opaque.

Composition.—(1) A gum, *Tragacanthin*, 33 p.c., only slightly soluble in water, unfermentable. (2) A gum resembling the *Arabin* of acacia, 33 p.c., soluble in water, from which it is precipitated by lead acetate or ferric chloride. (3) A little starch.

Enters into.—Conf. Sulphuris, Mist. Cretæ, Mist. Guaiaci, Pil. Ferri, Pil. Quinæ Sulph., Pulv. Opii Co. and the

OFFICIAL PREPARATIONS.

1. **Glycerinum Tragacanthæ.**—1 in 5.
2. **Mucilago Tragacanthæ.**—1 in 80. Alcohol (90 p.c.). *Enters into.*—Lotio Hydrarg Nigra.
3. **Pulvis Tragacanthæ Compositus.**—1 in 6. **B.P. Dose.**—20 to 60 grs.

NON-OFFICIAL PREPARATIONS.

1. **Gelanthum** (Unna).—Tragacanth 110 grs., Gum 30 grs., Gelatin 120 grs., Distilled water 10 ozs. Heat in a steam-bath for 4 hours, press through muslin, mix well, and add Glycerin 6 drs. Heat again in a water bath for an hour, and add distilled water (containing in solution Thymol $\frac{1}{4}$ gr.) *q.s.* to 12 ozs. Used as a basis for various drugs in skin medication.
2. **Linimentum Exsiccans.** *Syn.—Bassorin Paste.*—Tragacanth 5, glycerin 2, alcohol (90 p.c.) 10, water to 100. Dries quickly on the skin, producing a pleasant cooling sensation. May be medicated with any drug St. John's Hospital for skin diseases has the following "*Bassorins*" in use :—Boric acid 10 p.c , Salicylic acid 5 p.c., Chrysarobin 5 p.c., Hydronaphthol 5 p.c., Ichthyol 30 p.c., Resorcin 30 p.c., Precipitated Sulphur 30 p.c., Thioresorcin 5 p.c.

PHARMACOLOGY AND THERAPEUTICS.

In the form of Unna's Gelanthum, or the various "Bassorins," Tragacanth is very useful in the treatment of many **skin diseases**. It is a **demulcent**, and the official glycerin is a soothing application in **sore throat**, but its chief use is to **aid the suspension of heavy insoluble powders** in mixtures. As a rule the mucilage is to be preferred to the compound powder which, on account of the starch it contains, is apt to ferment. The powder however is especially useful for suspending the nitrate of bismuth.

TRINITROGLYCERIN. (*Not official*).

$C_3H_5[(NO_2)O]_3$.

Syn.—*Nitroglycerin*, *Trinitrin*, *Glonoin oil*, *Nobel's blasting oil.*

Source.—By dropping glycerin into an ice-cold mixture of nitric and sulphuric acids; but the latter acid merely acts by absorbing the water, which is given off, thus:—$C_3H_5(CH)_3 + 3HNO_3 = 3H_2O + C_3H_5(NO_2)_3$.

Characters.—A colorless, oily liquid, slightly soluble in water, easily in fats, oil, alcohol, and ether. Highly explosive. When mixed with silica, it forms dynamite.

Composition.—It is a *Nitrate of glyceryl.*

Action.—Relieves arterial spasm

B.P. Dose.—$\frac{1}{200}$ to $\frac{1}{50}$ gr., but never given undiluted.

OFFICIAL PREPARATIONS.

1. **Liquor Trinitrini.**—1 gr. in 110 ms. **B.P. Dose.**—$\frac{1}{2}$ to 2 ms.
2. **Tabellæ Trinitrini.**—$\frac{1}{100}$ gr. in each, with a chocolate basis to avoid risk of explosion. **B.P. Dose.**—1 to 2 tablets.

NON-OFFICIAL AND ALLIED PREPARATIONS.

1. **Injectio Nitroglycerini Hypodermica.**—Liq. Trinitrini 5, alcohol (90 p.c.) 2, distilled water to 12. *Dose.*—1 to 4 ms.
2. **Haustus Trinitrini.** (Vict. Park).—Liq Trinitrini 1 m, Sp. Chloroform 15 ms., Tr. Cardam. Co. 20 ms., water to 1 oz. *Dose.*—$\frac{1}{2}$ to 1 oz.
3. **Oleum Nitroglycerini.**—1 p.c. in almond oil. *Dose.*—1 or 2 ms., on sugar.
4. **Pilula Nitroglycerini.**—Containing $\frac{1}{50}$ to $\frac{1}{100}$ gr., with Oleum Theobromæ as a basis.
5. **Tabellæ Nitroglycerini Compositæ.**—Nitroglycerin $\frac{1}{100}$ gr. Amyl nitrite $\frac{1}{4}$ gr., Menthol $\frac{1}{50}$ gr., Capsicum $\frac{1}{100}$ gr.
6. **Erythrol Nitrate.** *Syn.*—*Tetranitrin. Nitro-erythrite.*—Formed by dissolving erythrol (see p. 276) in fuming nitric acid, and precipitating by sulphuric acid. Hard, colorless, tasteless acicular crystals, nearly insoluble in water. *Dose.*—$\frac{1}{2}$ to 1 gr., increased to 3 grs. or more.
7. **Tabellæ Erythrol Nitratis**, containing $\frac{1}{2}$ or 1 gr., chocolate basis.
8. **Mannitol Nitrate.** *Syn.*—*Hexanitrin*, *Nitro-mannite.*—In light acicular quinine-like crystals. More explosive than Erythrol, but not so costly. Is liable to decomposition. *Dose.*—1 gr., increased.
9. **Tabellæ Mannitol Nitratis**, containing 1 gr., chocolate basis.

PHARMACOLOGY AND THERAPEUTICS.

Nitroglycerin is a **nitrate**, but after absorption it is **converted into a nitrite** in the body, a change which also occurs if it is digested with blood outside the body. According to Hay, the astonishing activity of so small a dose as $\frac{1}{100}$ gr. is due to its

being absorbed unaltered by the stomach, which decomposes to a large extent the ordinary nitrites, and the *nascent* nitrous acid formed by its final decomposition in the blood and tissues exerts a more incisive action than the nitrous acid of a nitrite. Its action is the **same as that of amyl nitrite** (*q. v.*), but the effects of nitroglycerin. **though not so prompt,** are **more lasting** than those of amyl. For this reason, in the treatment of **angina pectoris,** nitroglycerin **should be given in the intervals between the attacks** with the object of curing the disease, whilst the inhalation of amyl nitrite should be reserved for the actual onset of the paroxysms. One of the drawbacks to the use of this drug is the fact that it is apt to cause a **severe throbbing headache.** This may be avoided by adopting the plan recommended by Whitla, who directs his patients to break up each tablet into 8 or more portions, and to take one of these portions every 15 or 20 minutes during the day. Of course, if an attack be impending, a large dose should be given at once, and the effect kept up by small ones. Patients rapidly become habituated to nitroglycerin, and the dose may be gradually increased until as many as 3, 4, or 6 tablets are taken when an attack of angina is threatening.

It has been successfully used for the purpose of lowering arterial tension in **Bright's disease,** where its slower and more permanent action is particularly valuable: for the same reason it is given for the **weak heart of fatty degeneration** and of **old people** Its virtues have been extolled in **epilepsy, sciatica, neuralgia, tinnitus aurium, puerperal eclamsia, asthma,** and **migraine.** It has been given *with elaterin* in **myxœdema,** and to cut short attacks of **renal** and **hepatic colic,** and **ague.** Small doses will prevent **sunstroke** It has been strongly recommended as a substitute for brandy, on account of its small dose and prompt action, in the **collapse** of **cholera** or that **following chloroform inhalation,** in **shocks from accidents,** and in **faintness after surgical operations.** It will relieve the **craving for morphia,** and is worthy of a trial in **dysmenorrhœa.** It also gives great relief in **senile restlessness.**

It will often prevent **sea-sickness,** and if the treatment be commenced after sickness has already occurred, the patient may continue to vomit but the horrible feelings of nausea and depression disappear, and the physiological effect of the drug does not occur. It must however be given cautiously, and for administration to ladies, delicate persons, or children, the treatment should be commenced with doses of $\frac{1}{200}$, $\frac{1}{400}$, or $\frac{1}{600}$ of a grain.

It is as a rule a perfectly safe drug, and even children have taken large doses without ill-effects. If symptoms of poisoning occur, **strychnine, ergot and belladonna are recommended as antidotes.**

Erythrol nitrate, being less powerful than amyl nitrate or nitroglycerin, is the best of the group for Bright's disease : it is however very costly.

TRITICUM.

See page 211.

TURPETHUM. Turpeth.

N. O. *Convolvulaceæ.* (*Ind. and Col. Addendum*).

Syn. I. V.—*Teuri*, Beng. *Tarbad*, Hind.

Habitat.—India, Eastern and American Colonies.

Source.—The dried root and stem of *Ipomœa turpethum.*

Characters.—In short pieces, ½ to 2 in. in diameter, from which the central woody portion is usually removed. Externally dull grey, with a twisted rope-like or columnar appearance.

Composition.—(1) A resin, *Turpethin*, which is a glucoside resembling convolvulin, the active principle of Jalap. The root contains 10 p.c. (2) A fatty substance. (3) A volatile oil. (4) Albumen, starch, yellow coloring matter, lignin, salts, and ferric oxide.

Action.—Drastic purgative. **B.P. Dose.**—5 to 20 grs., in powder.

Official Preparation.

1. **Tinctura Jalapæ Composita.—B.P. Dose.**—½ to 1 dr. (See page 464).

Pharmacology and Therapeutics.

As a **purgative** it is *equal to jalap* and *superior to rhubarb* ; it has moreover a great advantage over both these drugs in that it is free from nauseous smell and taste. It also acts very efficiently when given alone. It is often necessary to give it in larger doses than jalap, but this is no disadvantage. It has been in use in India as a **cathartic** from a very early date, and has a great reputation in **rheumatic** and **paralytic affections.** When combined with chebulic myrobalans (see p. 491), it is said to be useful in **melancholia** and **dropsy.** The usual method of administration is to rub down about a drachm of the root or stem with water and add to it some rock-salt and ginger, or sugar and black pepper.

TYLOPHORÆ FOLIA. Tylophora leaves.

N. O. *Asclepiadeæ.* (*Ind. and Col. Addendum.*)

Syn. I. V.—*Auntmul*,, Beng., *Antmul*, Hind.

Habitat.—India, and Eastern Colonies.

Source.—The dried leaves of *Tylophora asthmatica.*

Characters.—Petiolate, entire, 2 to 5 in. long, ¾ to 2½ in. wide, broad, ovate abruptly acuminate, leathery, upper surface glabrous, lower downy. Color brownish green.

Composition.—Contains a crystalline alkaloid, *Tylophorine.*

Action.—Emetic, expectorant.

B.P. Dose.—$\frac{1}{4}$ to 2 grs. as an expectorant ; 15 to 30 grs. as an emetic.

PHARMACOLOGY AND THERAPEUTICS.

Its action is precisely the same as that of ipecacuanha (*q. v.*), and it has been used with great success in the treatment of **dysentery.** It is also a useful **expectorant** and **diaphoretic** in **catarrhal affections.** Half a teacupful of the infusion makes an **excellent emetic for children** in **croup.**

URARI. N. O. *Loganiaceæ.*

(*Not official*).

Syn.—*Curare, Ourari, Wourara, Wourali.*

Habitat.—South America.

Source.—The South American arrow-poison, prepared from the bark and sap-wood of *Strychnos toxifera, cogens,* and *Schomburgkii* ; together with *Cocculus* and other plants.

Characters.—A blackish brown dry extract, with a bitter taste. Contains some resin but is almost entirely soluble in water.

Composition.—The active principle is *curarina* or *curarine*, a most powerful poison. It exists as a brown powder, or deliquescent prisms, with an intensely bitter taste, soluble in water and alcohol, the latter solution being slightly fluorescent. Is not alkaline in reaction and forms no true salts.

Tests.—It resembles strychnine in giving the characteristic play of colors, from blue to cherry-red, when treated with sulphuric acid and potassium bichromate ; and differs in being colored red by a solution of sulphuric acid alone, which has no effect on strychnine. The physiological test however is more valuable than the chemical.

Action.—Paralyses the end-plates of the motor nerves.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ gr., hypodermically.

NON-OFFICIAL PREPARATIONS.

1. **Injectio Curaræ Hypodermica. B. P. C.**—5 grs. to 1 dr. *Dose.*—1 to 6 ms.
2. **Lamellæ**, containing either $\frac{1}{400}$ gr. of curarine or $\frac{1}{20}$ gr. of curare.

PHARMACOLOGY.

Nervous system.—It **paralyses the terminal organs of the motor nerves,** its chief action, according to Pollitzer, being upon the cementing substance between the nerves at the nodes of Ranvier. It has no effect upon the conductivity of the trunks of the nerves, or upon the reflex excitability of the spinal cord. The sensory nerves are unaffected by curare. It **stimulates the secretory nerves,** and causes excessive secretion of the lachrymal glands, of saliva, and of urine.

Circulation.—Small doses have very little effect ; in larger doses the pulse becomes weak and frequent and there is a fall of blood-pressure due to general dilatation of the systemic arteries.

These effects are brought about by **paralysis of the vagus and vasomotor nerves.**

Sugar appears in the urine of animals poisoned by curare. **Respiration** is interfered with, owing to the paralysis of the respiratory muscles. There is also a **considerable fall in temperature**, and a diminution in the consumption of oxygen and formation of carbonic acid. Curare, as a rule, *only produces its physiological effects if given hypodermically*, and when taken into the stomach soon after food no results are observed. This is due to the fact that it is excreted by the kidneys more quickly than it is absorbed from the stomach. If the stomach be quite empty, or if the ureters be tied before the poison is administered, its full effect is produced. The urine of animals that have been placed under curare will poison other animals.

THERAPEUTICS.

Curare is chiefly used in the physiological laboratory, but it is also one of the most valuable drugs we possess for the treatment of **tetanus**, in which disease an adult can take as much as 4 grains in the 24 hours, by hypodermic injection, without ill-results occuring therefrom. It has been recommended as a palliative in **hydrophobia**, and is said to be of value in **chorea** and **epilepsy**.

Prescribing hints.—Curare must be carefully preserved from damp, which rapidly causes it to lose its potency. Whenever possible the active principle curarine should be used in preference to curare which is a generic name for a collection of various poisons, of uncertain strength. Remember that curare must always be administered hypodermically; for the reasons given above it is almost inert when given by the stomach.

Caution—When a patient is taking full doses of curare, he should be carefully watched for symptoms of respiratory paralysis, and *tracheotomy instruments should always be kept in readiness.* Directly respiration fails, tracheotomy must be performed and artificial respiration kept up as long as may be necessary. Artificial respiration without a preliminary tracheotomy is useless, as the paralysed vocal cords fall together and prevent the air from entering the lungs. At the same time the bladder must be emptied by the catheter to prevent reabsorption of curare which has been excreted with the urine, and stimulants must be exhibited to counteract the depressing effect of the drug upon the heart through the vagus.

UREA. $CO(NH_2)_2$.

(Not official.)

Syn.—*Carbamide.*

Source.—It may be prepared by evaporation from ammonium cyanate, with which it is isomeric; or may be built up synthetically in various ways.

Characters.—Silky four-sided prisms, or delicate white needles, has no action on litmus, odorless, taste bitter and cooling like saltpetre. *Solubility.*—Readily in water, but insoluble in ether.

Composition.—It is a *diamide of carbonic anhydride*, and may be regarded as one molecule of carbonic anhydride plus two molecules of ammonia, deprived of one molecule of water.

Action.—Diuretic. *Dose.*—5 to 20 grs.

NON-OFFICIAL PREPARATIONS.

1. **Urea Quinine.**—(See p. 337). Hypodermically, in **cholera.**
2. **Ursal.**—A combination of urea with salicylic acid, in white acicular crystals partially soluble in water, readily so in alcohol. Used in **gout** and **rheumatism.** *Dose.*—10 to 30 grs.

PHARMACOLOGY AND THERAPEUTICS.

The researches of Klemperer and Mering have shown that urea has the power of dissolving uric acid and enormously increasing the amount of urine. It has been strongly recommended as a preventive and cure of **uric acid calculi**, and as a diuretic in **cirrhosis of the liver, gouty affections** and **chronic kidney diseases.** For the latter purpose the daily dose at first is 2 drs., increased later to 4 or 5 drs.

For the solution of calculi, half a teaspoonful four times daily of a mixture of equal parts of urea, sodium bicarbonate, and calcium carbonate is recommended.

Urea also has a distinct antiperiodic effect in **ague.** The chief interest however in this drug centres, at the present time, in its alleged value as a remedy for **pulmonary phthisis.** In the hands of Hare it has yielded the most marvellous results, but the writer is bound to confess that. after an extended trial on carefully selected cases both in hospital and private practice, he has been bitterly disappointed in it, and is of opinion that, whatever may be its value in temperate climes, *it is of little or no use in the hot steamy atmosphere of Calcutta.*

URETHANE.

(Non-official.)

Syn.—*Ethyl-urethane.*

Source.—Prepared by the action of urea nitrate on ethylic alcohol.

Characters.—Colorless prismatic crystals, tasting like nitre, having no smell. Easily soluble in water.

Composition.—It is *ethyl carbamate.*

Action.—Hypnotic. *Dose.*—10 to 60 grains, in tabloid or cachet.

NON-OFFICIAL PREPARATIONS.

1. **Euphorin.** *Syn.—Phenyl-urethane, Carbanilic Ether.*—In white acicular crystals, slightly soluble in water, freely so in alcohol, with a faint clove-like odor and slightly acrid taste. Antipyretic, analgesic, antiseptic, and antirheumatic. *Dose.*—3 to 8 grs., in sherry, or tabloids.

2. **Hedonal**. *Syn.—Methyl-propyl-carbinol urethane.*—It is the urethane of a secondary amylic alcohol. In white, micro-crystalline powder, with a saline taste, slightly soluble in water, more so in dilute alcohol Hypnotic. *Dose.*—8 to 15 grs., in cachet or suspended in water.

3 **Somnal**. *Syn —Ethyl-chloral-urethane.*—A colorless liquid, with a faint chloral-like odor, formed by the combination of alcohol, chloral, and urethane. Hypnotic. *Dose.*—30 to 40 ms., in sherry.

4. **Ural**. *Syn.—Uralium, Chloral-urethane.*—A combination of chloral and urethane, in colorless shining lamellar crystals with a bitter taste. Hypnotic. *Dose.*—26 to 60 grs., in syrup flavoured with an essential oil to disguise its bitter taste.

PHARMACOLOGY AND THERAPEUTICS.

Urethane was introduced as a hypnotic by Schmiedeberg, who considered that the alcohol radicle would affect the cerebrum whilst the amidogen would stimulate the medulla and cord, and thus it would be free from danger to respiration and the heart. It retards digestion but does not disorder the stomach. At first it produces some excitement, but this is quickly followed by natural sleep, with some slowing of respiration and the pulse. Blood pressure is not lowered, but large doses depress the temperature and weaken, and even abolish the reflexes. It does not relieve pain It must be given in full doses of 20 to 30 grains, which may be repeated in an hour or two, if sleep does not follow the first dose. It is specially **suitable for children**, cases of **delirium tremens** and **acute mania**, and in the **insomnia of heart-disease**. It is **antagonistic to strychnia**, and has proved **more useful than chloral in tetanus**.

Euphorin appears to combine the properties of salicylic acid and antifebrin. It retards alcoholic fermentation and destroys pathogenic and other bacilli. Large doses weaken the pulse and respiration and lower the temperature, but do not affect the heart or blood-pressure. It has been used in much the same doses as antifebrin (8 grs.) in **fevers**, **neuralgia**, and **migraine**. Sansoni gave it in 20 to 30 grain daily doses in **acute rheumatism**, **sciatica**, **orchitis**, and other painful febrile affections. The powder is a very useful application for **chronic ophthalmia**, and both the powder and ointment are very efficacious in checking suppuration and removing foul odors in **syphilitic ulcerations**. It has been much praised in **gynæcological practice**.

Its antipyretic effect is prolonged and accompanied by profuse sweating. A dose of 8 grains is equivalent to 16 grains of antipyrin.

Hedonal is used as a hypnotic in **neurasthenia** and **hysteria in women**. It is safe and free from ill-effects, and will produce a sleep of seven hours duration.

Somnal was introduced as a hypnotic by Radlouer, who claims for it that it does not interfere with the digestion, respiration or circulation. Its effects begin in 30 minutes and it produces sound refreshing sleep, lasting from 6 to 8 hours, but it has yet to be proved that it is free from the dangerous depressing effects of chloral upon the heart.

Ural was introduced as a hypnotic by Bischoff and Poppi, and it is claimed for it to be rapid in its action and free from unpleasant results as the urethane is said to counteract the depressing effect of chloral. On the other hand it is uncertain in its effects, is unpleasant to take, and it has been found to reduce the blood pressure, and to be frequently followed by nausea and disorders of digestion.

URGINEA. Indian Squill. N.O. *Liliaceæ.*

(*Ind. and Col. Addendum.*)

Syn. I V.—*Junglī Peáj*, Beng., Hind.

Habitat.—India, and Eastern Colonies.

Source—The younger bulbs of *Urginea Indica*, taken soon after the plant has flowered.

Characters.—Bulbs with fleshy tunicated coats, varying greatly in size, color whitish, taste bitter and acrid.

Composition.—Similar to that of Scilla (*q.v.*).

Action.—Diuretic, expectorant. **B.P. Dose.**—1 to 3 grs.

OFFICIAL PREPARATIONS.

Six in number, resembling both in composition and dosage those of Scilla.

PHARMACOLOGY AND THERAPEUTICS.

Urginea has precisely the same action and uses as Scilla (see p 586).

UROTROPIN.

(*Not official.*)

Syn.—*Formin*, *Aminoform.*

Source.—By acting on ammonia with formalin.

Characters.—Colorless granular crystals, with an alkaline reaction. Easily soluble in water, less soluble in alcohol, and almost insoluble in ether.

Composition.—It is *hexamethylenetetramine.*

Action.—Diuretic, lithontriptic, urinary antiseptic.

Dose.—5 to 15 grs.

NON-OFFICIAL AND ALLIED PREPARATIONS.

1. **Formaldehyd.** *Syn.—Formic aldehyd.* CH_2O.—A gas. An aqueous solution, containing 40 p.c. of the gas, is known as *Formalin*, or *Formol.*

2. **Amyloform.**—By the action of formaldehyd on starch. An inodorous, insoluble, white powder, unaltered by heat. Used as an antiseptic dressing for wounds.

3. **Formoform.**—A dusting powder composed of formaldehyd, thymol, zinc oxide, and starch.

4. **Dextroform.**—A compound of dextrin and formaldehyd Used as an antiseptic, especially useful in **gonorrhœa**

5. **Glutol.** *Syn.—Formalin-gelatin.*—As an antiseptic dressing for **burns, cavities,** and **suppurating ulcers.**

6. **Paraform.**—A polymer of formaldehyd, in white friable amorphous masses, slightly soluble in water, and with an irritating vapour. Heated in an enclosed spirit-lamp, it sublimes, unites with the products of combustion, and is converted into formaldehyd. Has been recommended as **a disinfectant for the sick-room** after illnesses.

7. **Chinotropine.** *Syn.—Urotropine quinate.*—Contains quinic acid 73 p.c. and urotropine 23 p.c. A uric acid solvent. *Dose.*—Up to 90 grs. daily.

8. **Tannopine.** *Syn.—Tannol.*—A compound of tannin and urotropine. A brown tasteless odorless powder, insoluble in water, but soluble in dilute alkaline solutions. As an antiseptic and astringent in **urinary ailments,** in **tubercular ulceration,** and **typhoid diarrhœa.** *Dose.*—15 grs.

9. **Piperazine.** *Syn.—Diethylene diamine, Dispermine.*—Formed by the action of sodium glycol on ethylenediamine hydrochloride. In small colorless deliquescent crystals, with a strongly alkaline reaction, saline taste, and faint odor. Soluble 4 in 7 of water. Dissolves twelve times as much uric acid as lithium carbonate. *Dose.*—4 to 10 or 15 grs.

10. **Lycetol.**—*Dimethyl-piperazine tartrate.*—In **gout** and **rheumatism.**

11. **Lysidine.**—*Ethylene-ethenyl-diamine.*—A colorless liquid, recommended in **uric acid diathesis.** *Dose.*—10 to 30 minims.

12. **Sidonal.**—*Piperazine quinate.*—White crystalline granules. A uric acid solvent in **gout** and **allied affections.** *Dose.*—80 grains daily during pain.

PHARMACOLOGY AND THERAPEUTICS.

Urotropine and *Piperazine*, with their derivatives, are valuable **diuretics** and **solvents of uric acid.** Urotropine, which is decomposed in the blood into ammonia and formaldehyd, is also a **urinary antiseptic,** and on this account is given in **typhoid fever** to lessen the chance of cystitis. Piperazine is now a favorite remedy for **gout,** and is rapidly supplanting lithia. Being very deliquescent, it is best given in the granular effervescent form, or dissolved in soda water (15 grs. to each bottle). It is said to inhibit the transformation of glycogen into sugar in **diabetes,** and also to be very useful in the treatment of **renal colic.** A 1 or 2 p. c. solution of piperazine may be injected into the bladder for the solution of **uric acid calculi**; similarly ¾ gr. of lycetol in 8 ms. of distilled water may be injected hypodermically for the removel of **gouty tophi.**

Formalin is a **caustic.** When diluted with ten times its bulk of water, it is useful as a **hardening histological agent,** or as a **preservative for museum specimens.** It is a **powerful**

antiseptic, and is used for **sterilising instruments** and the **preservation of corpses for dissection**, but *on account of its necrotic action on the skin it is not suitable for wound treatment.* It causes **soft corns** to shrivel up.

Formalin 1, water 500, may be used as a mouth-wash in **stomatitis**, and a 1 p.c. solution is useful as a spray in **diphtheria** and **whooping-cough**. A 30 p.c. solution in glycerin makes an excellent pigment in **ringworm** and **parasitic skin diseases.**

Applied to **sarcomata** and **bleeding tumours**, it hardens their substance and facilitates their removal. It also lessens the fœtid smell in **bromidrosis of the feet.**

It has been strongly recommended as an antiseptic inhalation in **phthisis** and Maguire (Harveian Lectures for 1900) has recently introduced a method of treating this disease by the intravenous injection of formaldehyd dissolved in normal saline solution (1 in 2000). This solution is prepared by Messrs. Squire and Co under the name of "*Hæmasepsin*". A 20 p. c. solution has been recently introduced, under the names of *Holzine* and *Sterisol* for domestic use as an antiseptic for the sick-room, utensils, &c.

Paraform is used to disinfect rooms after illness: it requires a special apparatus which is known as the "*Formogene*" or "*Alformant*" lamp.

UVÆ URSI FOLIA. Bearberry leaves.

N.O. *Ericaceæ.*

Habitat.—England.

Source.—The dried leaves of *Arctostaphylos Uva-ursi.*

Characters.—Yellowish-green, obovate, entire, coriaceous, shining, leaves, about $\frac{3}{4}$ in. long, reticulated beneath; with an astringent taste and a haylike odor when powdered.

Adulteration.—Red whortleberry leaves, which are dotted beneath and have a toothed margin.

Identification.—Bearberry leaves are said to resemble those of Senna and Buchu, but are easily distinguished by their obovate shape, leathery consistency, and the characteristic reticulation beneath.

Composition.—(1) Two bitter crystalline glucosides, *Arbutin* and *Ericolin.* The former splits up into glucose, hydroquinone, and methyl-hydroquinone. (2) A tasteless neutral body, *Urson.* (3) Tannic and gallic acids, 33 p.c.

Incompatibles.—Salts of lead, iron, and silver, alkaloids, and gelatin.

Action.—Diuretic, urinary antiseptic.

Official Preparation.

1. **Infusum Uvæ Ursi.**—1 in 20 of boiling water. **B.P. Dose.**—$\frac{1}{2}$ to 1 oz.

PHARMACOLOGY.

Bearberry leaves owe their properties to the glucoside arbutin, which *at the time of its excretion by the kidneys is converted into hydroquinone* thus acting as a powerful **diuretic**, as well as an **astringent** and **disinfectant to the urinary mucous membrane**. It may also color the urine a dark greenish brown, similar to that seen in carbolic acid poisoning. The change to hydroquinone cannot occur in the blood, as hydroquinone is a violent poison whereas arbutin has no toxic properties.

THERAPEUTICS.

It is used in the same class of cases as Buchu, that is to say in **chronic inflammatory conditions of the bladder, pyelitis**, and **gonorrhœa**.

Prescribing hint.—The quantity of arbutin, in the infusion, is too small to be of much use, and yet if the infusion be made stronger the tannic and gallic acids in it may cause disturbance of the digestive functions. Pure arbutin is therefore to be preferred, and may be given in doses of 4 grains or more, three or four times a day, either in powder or in solution.

VALERIANÆ RHIZOMA. Valerian Rhizome.

N. O. *Valerianaceæ.*

Habitat.—Great Britain.

Source.—The dried rhizome and rootlets of *Valeriana officinalis*, collected in autumn from plants growing wild or cultivated.

Characters.—A short yellowish white rhizome, with numerous fibrous roots about two or three inches long; with a bitter camphoraceous taste and a characteristic penetrating odor which is developed by drying.

Identification.—Valerian resembles Serpentary, Senega, Arnica, and Green Hellebore, but is at once distinguished by its characteristic odor.

Composition.—Its chief constituent is a volatile oil, consisting of valerianic, formic, and acetic acids, united with pinene, a terpene, and borneol. When the plant is kept, *valerianic acid* is set free and gives rise to the characteristic odor. This acid, which exists in many plants and in cod-liver oil, is a derivative of amylic alcohol (*valeryl aldehyd*). It is colorless, oily, strongly acid, with a burning taste and the odor of valerian. *Solubility.*—1 in 30 of water, easily in alcohol and ether.

Action.—Antispasmodic.

OFFICIAL PREPARATIONS.

1. **Tinctura Valerianæ Ammoniata.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

2. **Zinci Valerianas.**—$Zn(C_5H_9O_2)_2$.—Made by mixing hot solutions of zinc sulphate and sodium isovalerianate. In pearly scales, with a characteristic odor and a metallic taste, soluble 1 in 120 of water. Incompatible with all acids, soluble carbonates, most metallic salts, and vegetable astringents. **B.P. Dose.**—1 to 3 grs.

NON-OFFICIAL PREPARATIONS.

1. **Ammonii Valerianas**.—In masses of flat colorless *deliquescent* crystals with a strong valerian odor, very soluble in water and alcohol. A 25 p.c. aqueous solution is prepared for dispensing. *Dose.*—1 to 8 grs.
2. **Pilula Trium Valerianatum**, containing 1 gr. each of the valerianates of quinine, iron, and zinc.
3. **Pilula Zinci Valerianatis**.—Zinc valerianate 1 gr., compound asafetida pill 2 grs. *Dose.*—1 or 2.
4. **Quiniæ Valerianas**.—See page 337.

PHARMACOLOGY AND THERAPEUTICS.

Small doses of valerian, like turpentine and the other volatile oils, produce a sensation of warmth in the epigastrium, a quickened pulse, an increase of the cutaneous secretion, and some mental excitement. Large doses slow the pulse, and cause nausea, vertigo, and delirium. There are considerable differences of opinion as to the manner in which Valerian produces its effects on the organism. *According to Brunton*, it **paralyses the central nervous system and the cord, reduces blood-pressure**, and **slows the pulse**; and *Binz has shown* that a previous injection of oil of valerian will **inhibit the convulsions which are caused in animals by brucine and ammonium carbonate**

Whitla, on the other hand, considers that it acts by **diminishing the irritability of the terminations of the sensory nerves throughout the body**. This theory is supported by *the observations of Martel*, who found that a strong decoction would greatly lessen the pain of wounds, for which purpose it is actually used by the inhabitants of Normandy.

Neligan regards it as a **powerful anthelmintic**, and specially recommends its use **in those cases in which worms excite convulsions**. The ammoniated tincture is useful, as a carminative, in **flatulence**; and, as a reflex stimulant, in **faintness** and **palpitations**, but the essential oil (2 to 5 m.) suspended in mucilage with cinnamon water is better still. It has also been used with advantage in certain forms of **epilepsy, chorea, laryngismus stridulus**, and **whooping cough**; whilst large and increasing doses are said to lessen the secretion of urine in **diabetes insipidus**. Ammonium valerianate, in 20 gr. doses, is of value in **neuralgias of the** face and head, and doses of 2 to 5 grs. will often relieve the paroxysms of **migraine**.

The Pilulæ Trium Valerianatum are efficient nervine tonics. Valerianate of Quinine is recommended for **nervous headaches**, **neuralgias**, and **hysteria**, especially if intermittent and spasmodic. It is best given in pill form, with glycerin of tragacanth and a little acacia as excipient, and it may with advantage be combined with opium.

The best known salt of them all is the valerianate of zinc, which is credited with possessing both antispasmodic, antihysteric, and antiperiodic properties. It is of great use in the **flushings of the face, hot and cold sweats, sensation of suffocation in the throat,** and **nervous palpitations,** to which hysterical patients are subject.

It will also prevent the recurrence of attacks of **hay-fever.**

Note.—Seeing that Valerianic acid has not been proved to have any important physiological action, it is advisable whenever it is desired to combine the nervine tonic action of zinc with the antispasmodic effect of valerian to administer oxide of zinc in combination with some preparation of valerian rhizome or else the essential oil, and not to trust to the artificially prepared valerianate.

VALERIANÆ INDICÆ RHIZOMA. Indian Valerian.

(Ind. and Col. Addendum.)

Syn. I. V.—*Jatamansi*, Beng.

Habitat.—India and Eastern Colonies.

Source.—The rhizome and rootlets of *Valeriana Wallichii.*

Characters—A dull brown, crooked rhizome, about 2 in. long and ¼ to ½ in. in diameter, marked with transverse ridges and thickly studded with circular prominent tubercles, to which a few thick rootlets are attached. The crown has a number of bracts ; lower end blunt. Smell characteristic.

Official Preparation.

1. **Tinctura Valerianæ Indicæ Ammoniata.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

The action and uses of Indian Valerian are precisely the same as those of ordinary Valerian (see above).

VERATRINA. Veratrine.

N. O. *Melanthaceæ.*

Habitat.—Mexico.

Source.—Prepared from *cevadilla*, or *sabadilla*, the seeds of *Schoenocaulon officinale*, by adding a concentrated tincture of the seeds to water (which throws down albumen and resins). The watery liquid is then filtered and treated with ammonia, which precipitates the alkaloids.

Note.—Bear in mind that veratrine is *not* prepared from the *Veratrum Viride*, or Green Hellebore, the alkaloids of which are *Jervine* and *Veratroidine.*

Characters.—A pale grey amorphous powder, with no smell but very irritating to the mostrils and exciting sneezing. Taste bitter and acrid. *Solubility.*—1 in 6 of ether, 1 in 3 of alcohol, readily in dilute acids, almost insoluble in water.

Pure veratrine, $C_{37}H_{53}NO_{11}$, crystallises in rhombic prisms.

Composition.—It is a mixture of three alkaloids, *veratrine*, *cevadine*, and *cevadilline*.

Action.—Local anæsthetic.

B.P. Dose.—$\frac{1}{70}$ to $\frac{1}{16}$ gr., in pill. (*Rarely given internally.*)

OFFICIAL PREPARATION.

1. **Unguentum Veratrinæ.**—1 in 45, white.

NON-OFFICIAL PREPARATIONS.

1. **Oleatum Veratrinæ, U. S.**—2 p.c. in oleic acid. Too weak. 10 p.c. preferable.
2. **Amyl Colloid.** *Syn.—Anodyne Colloid.*—Amyl hydride 1 oz., aconitine 1 gr.; veratrine 6 grs., collodion to 2 ozs. (see p. 354).

PHARMACOLOGY.

Externally.—When rubbed in, it causes **numbness**, followed by a sensation of cold and **anæsthesia** with loss of tactile sensibility, and inability to distinguish between heat and cold. The numbness is often preceded by a burning pricking sensation. When given hypodermically, it causes violent pain and irritation, and sometimes even inflammation.

Internally. **Gastro-intestinal tract**—The smallest possible quantity placed in the nostril brings on a violent fit of **sneezing with discharge of bloody mucus.** Similarly, when placed on the tongue, it causes intense **itching of the palate**, with burning pain in the mouth and **salivation.** When it reaches the stomach, a sensation of warmth is experienced, which soon becomes of a burning character; later on **violent vomiting, griping,** and **diarrhœa** appear, and the vomited matter may be mixed with blood. These symptoms also appear when veratrine is given hypodermically.

Blood—It is absorbed quickly, but is not known to affect the living blood. Outside the body it kills leucocytes.

Heart.—It **acts directly upon the cardiac muscle, the contractions of which become longer and longer**, the rate being diminished to one half owing to the prolongation of the systole. Finally all parts of the heart become insensitive although it still contracts occasionally. Ultimately it stops in systole. The **functional activity of the vagus is first exalted,** which increases the slowing of the heart. Later on the vagus is depressed, but the direct action of the veratrine on the heart prevents any quickening of the pulse though the beat may become irregular The blood pressure at first rises and then falls.

Respiration.—After small doses, respiration is quickened, but large ones retard it, producing long pauses and finally **arresting it altogether.** These results are probably due to primary stimulation and subsequent paralysis of the terminations of the vagi in the lungs, and also to paralysis of the respiratory centre. Temperature is lowered.

Nervous system.—It has no effect upon the brain or spinal cord. The terminations of **both motor and sensory nerves** are **first excited** and **then paralysed.**

Muscles.—Here the effect is very peculiar and characteristic. It causes an **enormous prolongation of each contraction.** The latent period and the time of the ascent of the curve is unaltered but the height is greatly increased and the descent is extraordinarily extended. A similar form of contraction, which is neither rigor nor tetanus, is met with in **Thomsen's disease.** Brunton has shown that this effect of veratrine is abolished by extremes of either heat or cold, as well as by the local application of potassium salts.

THERAPEUTICS.

Externally.—It is chiefly used as an inunction for various **neuralgias.** The best results are obtained in the case of **the fifth nerve,** but it has been found of value in **severe sciatica** and **sick headaches** Its use is generally followed by some local irritation of the skin. When it comes in contact with the nasal mucous membrane it acts as a **sternutatory** and **errhine.** It will relieve the neuralgic pain that accompanies **herpes zoster,** or **shingles.**

The amyl colloid is an elegant method of obtaining the local action of aconitine and veratrine, which is aided by the evaporation of the amyl hydride. After the collodion has formed a film, the application of a piece of warm moist spongiopilene helps the anæsthetic action of the alkaloids.

Doses of $\frac{1}{16}$ gr. twice a day do good in **neuralgia** and **nervous diseases,** and of $\frac{1}{130}$ gr., four times a day have relieved the tremors of **chronic alcoholism** and **disseminated sclerosis** : it is also recommended both internally and externally for **pruritus,** and it has been proved to be an **antipyretic.** On account however of its action upon the heart and collateral effects, *it is very rarely prescribed for internal use*, and must be given with extreme caution and in infinitesimal doses.

VIBURNUM. Black Haw.

N. O. *Caprifoliaceæ.*

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern and North American Colonies.

Source.—The dried bark of *Viburnum prunifolium.*

Characters.—In thin pieces or narrow quills, glossy purplish-brown, with scattered warts and minute black dots; when collected from old wood, covered with a greyish-brown periderm which is easily removed. Inner surface smooth, pale yellow. Fracture short. Inodorous, somewhat astringent and bitter.

Composition.—Its active principle has not yet been isolated, but it contains (1) *Viburnin*, a glucoside. (2) Valerianic, tannic, gallic, oxalic, citric, and malic acids

Action.—Astringent, bitter nervine tonic, uterine sedative.

OFFICIAL PREPARATIONS.

1. **Extractum Viburni Prunifolii Liquidum.**—1 in 1 of alcohol (70 p. c.) **B.P. Dose.**—1 to 2 drs.

NON-OFFICIAL PREPARATIONS.

1. **Malto-Viburnin.**—A combination with extract of malt. *Dose.*—1 to 4 grs.
2. **Celerina.**—A specialty, containing viburnum in combination with celery, coca, and kola. Recommended as a nervine tonic.

PHARMACOLOGY AND THERAPEUTICS.

Viburnum **depresses the motor functions of the cord** producing paralysis and loss of reflex. It **slows the heart, lowers blood-pressure** and causes death by cardiac paralysis. Large doses cause **headache, amaurosis** and **dryness of the mouth.**

It has been used as a sedative in **neurotic** and **hysterical affections,** and as an astringent in **sore throat, diarrhœa,** and **dysentery**; but its chief value is in the treatment of obstetric diseases, for which purpose, according to Schatz, it possesses virtues owned by no other drug It undoubtedly diminishes or checks altogether uterine contractions occurring during pregnancy and endangering its continuance, and it is therefore of use in cases of **habitual abortion,** when this does not arise from any specific cause such as syphilis or nephritis. Its action is greatly superior to that of morphine or bromide of potassium, but it may often be advantageously combined with the latter at the commencement of the treatment. The best form in which to prescribe it is a teaspoonful of the liquid extract mixed with an equal amount of alcohol twice daily. It must be given for a considerable period. In **habitual dysmenorrhœa** we must commence the administration of the drug ten or fourteen days before the period is expected. It is also given to check **menorrhagia** occurring at the menopause, and to relieve the **pains preceding and following parturition.**

Note.—The dried leaves of an allied species, *Viburnum opulus* (The Snowball Tree), or an infusion of the dry berries are stated by Jacubovsky and Manguby to relieve **angina pectoris**; whilst a fluid extract of the bark is extensively used in America both as an antispasmodic in **colic, hysteria,** and **dysmenorrhœa,** and as a uterine sedative in **menorrhagia** and **threatened abortion.** It goes by the name of "*Cramp Bark.*"

ZINCUM. Zinc. Zn.

Syn. I.V.—*Dastá*, Beng.

ZINCI CHLORIDUM. Zinc Chloride. ZnCl.

Source.—By dissolving zinc in hydrochloric acid. It is then purified from lead or iron by passing chlorine through it and adding zinc carbonate.

Characters.—Colorless opaque *deliquescent* rods, or tables, powerfully caustic. *Solubility.*—Freely in alcohol, water, and ether. *Impurities.*—Iron, lead, calcium, and sulphates.

Action.—A powerful caustic (only used externally). Also antiseptic.

OFFICIAL PREPARATIONS.

1. **Liquor Zinci Chloridi.**—4 ms. equals 3 grs. of solid zinc chloride. Sp. gr. 1.53. *Note.*—On diluting this liquor with water a white precipitate of *basic oxychloride* is formed, which may be redissolved by adding a trace of hydrochloric acid.

NON-OFFICIAL PREPARATIONS.

1. **Causticum Zinci Chloridi.** (St. John's Hosp.).—Zinc chloride 4, solution of Antimony chloride 2, Starch 1, Glycerin *q. s.*

2. **Collodium Zinci Chloridi,** 1 in 6, forms an imperfect solution.

3. **Guttæ Zinci Chloridi,** R. O. H.—0.5 in 100.

4. **Guttæ Zinci Chloridi cum Cocaina,** R. O. H.—0.5 and 2.0 in 100.

5. **Pasta Zinci Chloridi.**—Zinc chloride 16 ozs., Pulv. opii 1⅛ oz., Hydrochloric acid 6 drs., boiling water to 1 pint. Macerate the opium in 12 ozs. of the water for 12 hours, add the acid, and filter, dissolve the zinc chloride in the filtered liquid, and add water *q. s.* to produce 1 pint. Then, to 1 oz. of the above solution, add wheaten flour 120 grs., mix, and heat in a water-bath until of a proper consistence.

6. **Darts** or **Fleches,** spear-shaped, are also made of zinc chloride mixed with an equal weight of either oil of theobroma or gutta percha. They are intended for insertion into wounds or lancet incisions, and are used in the treatment of malignant tumours which cannot be removed by operation.

PHARMACOLOGY AND THERAPEUTICS.

It is a powerful **caustic,** distinguished by its property of **burning deeply** and not spreading sideways like caustic potash and soda. It is also painless. The paste is applied to **cancers, sloughing or unhealthy sores,** and **nævi**; the surrounding skin being first protected by sprinkling it with plaster of Paris. Diluted it is applied to **ulcers.**

It has been used to destroy the **exposed pulp in carious teeth, warts, condylomata,** and **lupus,** whilst in recent times it has been employed as an **antiseptic in the treatment of wounds,** which are covered with a mixture of zinc chloride 5 parts, zinc oxide 50 parts, water 50 parts. This causes them to heal without suppuration.

Similarly a solution of zinc chloride 1 part in 11 of distilled water is particularly useful as an antiseptic when applied to the cut surfaces in cases of **excision of the tongue, removal of the jaw, or operations about the anus,** and **after amputations and excisions in parts affected with putrid sinuses** Under these circumstances it renders the wound incapable of putrefaction for 2 or 3 days, even though it be exposed to septic influences. Zinc chloride will also render aseptic a wound that has become septic, and an 8 p.c solution is more energetic than a 5 p.c. solution of carbolic acid. At the same time it is useful in **checking parenchymatous oozing** after operation.

A 1 p.c. solution injected into **ranulæ and ganglions** causes the cysts to harden and does not give rise to any pain.

The interstitial injection of a solution of zinc chloride into the tissue surrounding tubercular foci has been recommended by Lannelongue as a remedy for **tuberculosis** : It causes sclerosis and the activity of the bacilli is suspended. A similar treatment has been used, with some success, for **malignant new growths**.

A weak solution of one or two grains *in a pint* of water is strongly recommended by Ringer, who states that if this solution be injected hourly during the day at the beginning of a **gonorrhœa**, it will cure the disease in 24 to 48 hours.

An impure solution, known as **Sir W. Burnett's Disinfecting Fluid**, is a powerful deodorising solution, especially useful for disinfecting the utensils in the sick-room of fever patients ; it quickly permeates or disintegrates all organic matter with which it comes in contact. The chief objection to its use is that, although it is a violent poison, it is both odorless and colorless, and it is *by the accidental drinking of this fluid that most cases of zinc-poisoning occur.* Zinc chloride is **never given internally**.

Toxicology.—The symptoms and treatment of poisoning by zinc chloride are practically the same as already described under the head of the caustic alkalies (see page 594).

ZINCI SULPHAS. Zinc Sulphate.

$ZnSO_4, 7H_2O$.

Syn. Commercial.—*White Vitriol.*

Source.—By dissolving zinc in sulphuric acid, and purifying in the same way as the chloride.

Characters.—Colorless transparent prismatic crystals, with a strong metallic styptic taste. *Impurities.*—Lead, copper, iron, arsenic.

Identification.—*Closely* resembles magnesium sulphate, but may be distinguished by its metallic taste and by the fact that the crystals are not so moist as those of magnesium sulphate and consequently do not stick so closely to the sides of the bottles.

Incompatibles.—Alkalies and their carbonates, lime-water, lead acetate, silver nitrate, vegetable infusions and decoctions, and milk.

Action.—Astringent, tonic, emetic.

B.P. Dose.—1 to 3 grs. (tonic). 10 to 30 grs. (emetic).

OFFICIAL PREPARATION.

1. **Unguentum Zinci Oleatis.**—1 in 2. With white vaseline as a basis.

NON-OFFICIAL PREPARATIONS.

1. **Collyrium Adstringens Luteum. P. Austr.**—Ammonium chloride 5, zinc sulphate 12½, distilled water 2,000, dissolve and add camphor 4, dissolved in dilute spirit (sp. gr. 0.895) 200. Then add saffron 1. Digest for 24 hours and filter.

2. **Lotio Rubra.**—Zinc sulphate 2 grs., Tinct. Lavend. Co. 15 ms., Water 1 oz.

3. **Lotio Sulphatum.**—Zinc Sulphate 30 to 40 grs., Alum 30 to 40 grs., Ferrous Sulphate 20 grs.. Copper Sulphate 2 grs., Water 8 ozs. For **gleet.**

4. **Ophthalmic discs**, containing $\frac{1}{250}$ gr. zinc sulphate, and $\frac{1}{250}$ gr. each zinc sulphate and opium respectively.

5. **Points** of zinc sulphate, or equal parts zinc sulphate and alum or copper sulphate, are moulded for **intrauterine medication.**

6. **Antiseptin**, said to consist of zinc sulphate 85, boric acid 10, zinc iodide 2½, thymol 2½. Used as a 1 to 2 p.c. solution, 10 p.c. ointment, and as a dusting powder with talc.

ZINCI CARBONAS. Zinc Carbonate.

$ZnCO_3\ (Zn2HO)_2\ H_2O.$

Syn.—*Zinc Hydroxycarbonate.*

Source.—By boiling together solutions of zinc sulphate and sodium carbonate, and drying the precipitated zinc salt.

Characters.—A white tasteless inodorous powder. *Solubility.*—It is insoluble in water; soluble with effervescence and without residue in dilute nitric acid. *Impurities.*—Sulphates, chlorides, copper.

B.P. Dose.—1 to 3 grs. (tonic). 10 to 30 grs. (emetic). Rarely used, except to make the oxide and acetate.

NON-OFFICIAL PREPARATIONS.

1. **Calamina Præparata.** *Syn.—Prepared Calamine.*—Prepared by calcining native carbonate of zinc and reducing it to an impalpable powder. A pale pinkish-brown powder, without grittiness.

2. **Ceratum Calaminæ.** *Syn.—Turner's Cerate.*—Calamine and yellow wax, of each 15, olive oil 40. A useful application to **burns.**

3. **Linimentum Calaminæ.**—Calamine 20 grs., zinc oxide 15 grs., limewater 2 drs., water 2 drs, olive oil to 1 oz.

4. **Lotio Calaminæ.**—Levigated Calamine 40 grs., zinc oxide 20 grs., glycerin 20 ms., rosewater to 1 oz. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in **eczema**, and **to conceal acne spots on the face.**

5. **Uuguentum Calaminæ, B.P. 1885.**—Calamine 1, Adeps Benzoata 5.

ZINCI OXIDUM. Zinc Oxide. ZnO.

Source.—Prepared by the combustion of metallic zinc, or by heating the carbonate to redness in a crucible.

Characters.—A soft, nearly white, tasteless and inodorous powder, becoming pale yellow when heated. Insoluble in water. *Impurities.*—The carbonate and its impurities.

B.P. Dose.—3 to 10 grs.

Official Preparation.

1 **Unguentum Zinci.**—3 in 20. Made with Adeps Benzoata.

Non-Official Preparations.

1. **Unguentum Zinci cum Acido Salicylico.**—Salicylic acid 40 grs., Zinc Ointment and Soft Paraffin of each 1 oz.
2. **Cremor Zinci.**—Zinc oxide 3, white vaseline 17, perfume *q.s.*
3. **Gelatinum Zinci.**—Gelatin 5, water 9, soak 12 hours, then heat to dissolve, and add zinc oxide 2, previously rubbed down with glycerin $4\frac{3}{4}$. For use it is melted and applied with a brush to eczematous surfaces. This **gelatin basis** may be combined with ichthyol or resorcin.
4. **Gelatina Zinci Dura.** (St. John's Hosp.).—White gelatin 4, zinc oxide 3, glycerin 5, water 9. Use 1 part less of zinc oxide if to combine with ichthyol or precipitated sulphur.
5. **Lassar's paste for Eczema.**—Zinc oxide 24, starch 24, salicylic acid 2, vaseline 50.
6. **Pilula Zinci cum Belladonna.**—Zinc oxide 2 grs., green extract of belladonna $\frac{1}{8}$ gr. *Dose.*—1 or 2 at bed-time. In **night-sweats of phthisis.**
7. **Pulvis Zinci et Amyli.**—Zinc oxide 1, starch 2.
8. **Pulvis Zinci et Hydrargyri subchloridi.**—Zinc oxide, calomel, tannic acid, and starch, equal parts.
9. **Plaster Mulls** and **Salve Mulls** are also prepared, either alone or combined with ichthyol or red mercuric oxide.

ZINCI ACETAS. Zinc Acetate.

$Zn(C_2H_3O_2)_2, 3H_2O.$

Source.—By dissolving zinc carbonate in dilute acetic acid, boiling, and allowing the zinc acetate to crystallise out.

Characters.—Thin, translucent, colorless, crystalline plates, of a pearly lustre, and with a sharp unpleasant taste. *Impurities.*—Those of the carbonate.

Incompatibles.—The same as of the sulphate.

B.P. Dose.—1 to 2 grs. (tonic), 10 to 20 grs. (emetic).

Pharmacology of Zinc Sulphate, Carbonate, Oxide, Oleate, and Acetate.

Externally.—Their action resembles that of the lead and silver salts, *i.e.* they precipitate the albumen in the discharges and in the tissues and are therefore **astringents** and **mild hæmostatics.**

On the whole however they are less powerful, and the astringent action of the carbonate and oxide is very weak.

Internally. **Gastro-intestinal tract.**—All of them have an astringent action on the mucous membranes, and in large doses, with the exception of the oxide, they act as **direct emetics**; their action being very prompt and not followed by depression.

Remote effects.—Very little is known on this point, nor do we know how zinc salts act on the blood, in which fluid they undoubtedly remain for a time, probably in the form of albuminates. They are gradually eliminated in the fæces and slightly by the kidneys. After a prolonged course of zinc salts symptoms of chronic poisoning may show themselves, closely resembling those of plumbism. They are said to have a **sedative action on the nervous system**, and to be **remote astringents**: the latter however is doubtful.

In the zinc mines of Silesia the workmen suffer from obstinate catarrh of the respiratory and gastro-intestinal tracts, in consequence of inhaling the dust of zinc oxide, and this is followed by general cachexia, and occasionally by all the symptoms of tabes dorsalis. Experiments on animals have shown that another effect of the chronic toxic action of zinc is inflammation and fatty degeneration of the epithelium of the renal tubules.

Therapeutics of Zinc Sulphate, Carbonate, Oxide, Oleate, and Acetate.

Externally.—Lotio Rubra, or *red wash*, is an excellent stimulating and astringent application to all sorts of **wounds** and **ulcers**, and is used as an injection in **gonorrhœa**, **leucorrhœa**, **vulvitis**, and **otitis**. The ordinary strength is 2 grs. to the ounce, but 3 grs. is a better strength for leucorrhœa, and 1 gr. for otitis. Without the addition of the compound tincture of lavender, zinc lotion (1 or 2 grs. to the ounce) is used as a collyrium in **conjunctivitis**, provided that there be no ulceration of the cornea Where a less astringent effect is desired, the oleate, oxide or carbonate should be used in any of the various forms described above. Oxide of zinc is particularly useful for all the **skin affections of children**, and the Cremor Zinci is invaluable for nursery use as a substitute for violet-powder. Lassar's paste and the Unguentum Metallorum (see p. 432) are good applications for many varieties of **eczema**. Equal parts of zinc oleate, mercuric oleate, and diachylon ointment (p. 545) form an ointment which is a great improvement on the old unguentum metallorum, as it is transparent, and the progress of healing can be watched without removing the dressing. All the preparations of calamine are excellent "drying applications" for the treatment of **intertrigo** and **skin diseases**, and Turner's cerate is especially good for **burns**. The gelatinum zinci often relieves obstinate **pruritus**, and the points of zinc sulphate can be used as a caustic for **uterine** and **other ulcers**.

Internally. **Gastro-intestinal tract**.—Sulphate of zinc is an *excellent emetic in cases of poisoning*, and is occasionally used for this purpose in croup and bronchitis, but it is not a safe emetic for very young children. When however an urgent action is required, a dose of 2½ to 3 grs. may be given to a child one year old, and the dose may be repeated in 15 minutes. To a child of 5 years old as much as 10 grs. may be given, followed by copious draughts of water. Small doses of the sulphate or oxide are occasionally given as **astringents** in **diarrhœa**.

Remote effects.—As nervous depressants, both the sulphate and oxide have been given internally in **hysteria**, **epilepsy**, **whooping-cough**, and **chorea**, but it is probable that they are not of any great value in the treatment of these diseases. Oxide of zinc, in combination with belladonna, is occasionally useful for checking the **night-sweats of phthisis**.

Zinc salts are reputed to be powerful "**nervine tonics**," whatever that may mean, and Hammond strongly recommends zinc oxide in 2 to 5 gr. doses as a remedy for **nervous headache**.

ZINCI SULPHOCARBOLAS. Zinc Sulphocarbolate.

See page 181.

ZINCI VALERIANAS. Zinc Valerianate.

See page 644.

NON-OFFICIAL SALTS OF ZINC.

1. **Zinci Boras**.—Zinc Borate. A white amorphous powder, used in the form of ointment for eczema.
2. **Zinci Bromidum**.—A white, granular, deliquescent powder, with a sharp saline and metallic taste. *Dose*.—3 to 10 grs. in epilepsy. Not well borne.
3. **Zinci Citras**.—A basic salt, not perfectly soluble in water. Given in doses of 3 to 12 grs. for epilepsy.
4. **Zinci Cyanidum**.—An insoluble white powder, resembling digitalis in its action. Is of value in heart disease. *Dose*.—$\frac{1}{10}$ to 1 gr.
5. **Zinci et Potassii Cyanidum**.—A soluble cyanide, possessing all the properties of hydrocyanic acid in a stable form. *Dose*.—$\frac{1}{10}$ to 1 gr.
6. **Zinci Lactas**.—In white crystalline crusts. Has been much used in France as a remedy for epilepsy. *Dose*.—3 to 30 grs.
7. **Zinci Nitras**.—A caustic like the chloride, but penetrates deeper and causes less pain.
8. **Zinci Permanganas**.—As an injection in gonorrhœa (see p. 563).
9. **Zinci Sulphis**.—Used as an antiseptic.
10. **Zinci Sulpho-ichthylas**. (See Sodium Sulpho-ichthyolate).

ZINGIBER. Ginger.

N. O. *Scitamineæ.*

Habitat.—East and West Indies.

Source.—The scraped and dried rhizome of *Zingiber officinale.*

Characters.—Flattish, irregularly branched pieces, about 3 to 4 in. long, each branch crowned by a depressed scar. Externally pale buff, striated, fibrous. Fracture mealy, short, rather fibrous. Odor wellknown, agreeable and aromatic. Taste strong, pungent.

Identification.—Resembles turmeric, but is distinguished both by its taste and smell, and by the fact that it is not yellow.

Composition.—(1) An aromatic volatile oil to which the flavour is due. (2) *Gingerin* or *Gingerol.* (3) Several resins and allied bodies.

Action.—Carminative and antispasmodic.

B.P. Dose.—10 to 20 grs.

Enters into.—Infusm Sennæ, Mist. Sennæ Co , Pil. Scillæ Co., Pil. Gambogiæ Co., Pulv. Cinnamomi Co., Pulv, Jalap. Co., Pulv. Opii Co., Pulv. Rhei Co., Pulv. Scammon. Co., Pill. Aloes et Ferri. and the

OFFICIAL PREPARATIONS.

1. **Syrupus Zingiberis.**—1 in 40. **B.P. Dose.**—½ to 1 dr.
2. **Tinctura Zingiberis.**—1 in 10. **B.P. Dose.**—30 to 60 ms.

Enters into.—Pil. Scammon. Co., Acid Sulphuric Arom., Infus. Cinchonæ Acid., Solutio Sennæ Concentratus.

PHARMACOLOGY AND THERAPEUTICS.

Ginger is a powerful **aromatic stimulant**, acting like capsicum and cardamoms (which see). Chewed, it is a valuable **sialagogue**; and used as snuff, it is a powerful **errhine**, but it is chiefly given as a **stomachic, carminative**, and **flavouring agent**. Commercial Gingerin, which is an oleo-resin is a useful addition to purgative pills to prevent griping. The dose is ¼ to 1 grain.

FINIS.

ADDENDUM.

On page 542, under the head of "**Non-official preparations of Coal Tar**", after "**Creolin**" add the following :—

2. **Chinosol.**—The potassium salt of a compound of oxychinoline and sulphuric acid, in yellow minutely crystalline powder, readily soluble in water. Used as a surgical antiseptic ; 15 grains to the pint equals 1 in 40 of carbolic acid. Should not be used for the sterilisation of instruments, as it is apt to stain them badly.

3. **Izal.**—A proprietary name. A white emulsion of oxidised hydrocarbons, obtained from coal oil, contains very little phenol or its homologues. A non-poisonous antiseptic and disinfectant. A ½ p. c. solution is very popular in obstetrical practice.

4. **Lysol.**—A German specialty. A dark colored liquid, obtained by the saponification of cresols, and containing the higher homologues of phenol. Soluble in all proportions in water, and much less poisonous than phenol. A 2 p. c. solution is much used in surgery and gynæcological practice. It does not affect instruments, but, being a soapy fluid, it may make them difficult to hold

INDEX.

A
Aarar ka tel 465
Abbreviations 114
Abernethy's lotion 173
A. B. C. Liniment 202
Abhoyá 490
Abrastol 494
Absolute alcohol 212
Abstracts 25
Acaciæ Gummi 169
Acalypha 170
A. C. E. Mixture 327
Accelerator centre, action on 142
Accumulation 108
Aceta 15
,, table of 15
Acetanilide 170
Acetic Ether 210
Acetopyrin 527
Acet-Phenetidin 526
Acetum 171
,, Hygrophilæ ... 443
,, Mylabridis... ... 490
Acids 5
,, diluted 17
,, ,, table of ... 17
Acidum Aceticum 171
,, ,, Glaciale 171
,, ,, Dilutum ... 171
,, Aceto-Salicylicum ... 196
,, Arseniosum ... 172
,, Benzoicum ... 269
,, Boricum 177
,, Cacodylicum ... 174
,, Camphoricum ... 300
,, Carbolicum ... 180
,, Catharticum ... 591
,, Chromicum 184
,, Chrysophanicum ... 246
,, Citricum 185
,, Gallicum 403
,, Gynocardicum ... 421
,, Hydrobromicum Conc. 187
,, ,, Dil. 187
,, Hydrochloricum ... 188
,, ,, Dil. 188
Acidum Hydrocyanicum Dil. 191
,, ,, (Scheele) 192
,, Lacticum 193
,, ,, Dil. ... 194
,, Nitricum 188
,, ,, Dil. ... 189
,, Nitro-hydrochloricum Dil. 189
,, Oleicum 194
,, Phosph. Conc. ... 189
,, ,, Dil. ... 189
,, Salicylicum ... 105
,, Scleroticum ... 381
,, Sulphuricum ... 190
,, ,, Dil. ... 190
,, ,, Aromat. 190
,, Tannicum ... 403
,, Tartaricum ... 186
,, Trichlorphenicum ... 181
Aconiti Radix 201
Aconitina 202
Aconitinæ Oleatum ... 202
Acteæ Racemosæ Radix ... 333
Actol 248
Adeps Benzoata 204
,, Lanæ 204
,, Hydrosus 205
,, Myristicæ 492
Adhatoda 205
,, Cigarettes ... 205
Adhesive plaster ... 21, 569
Adjuvant in a recepe. ... 117
Administration of drugs ... 103
Adulteration 7
Æther 206
,, Aceticus 210
,, Ethylic 206
,, Methylatus... ... 206
,, Sulphuric 206
Afim 502
Affusion cold 62
Agathin 196
Agropyrum 211
Air, action on 133
Airol 275
Ajawan ka tel 211
Akarkara 567

Alabastrine 494
Alcohol 212
Alembroth Gauze and Wool... 430
,, Salt 430
Alkátra 542
Alkaloids 4
,, table of 5
Almond Cosmetic Cream ... 233
Almonds, Sweet and Bitter ... 232
,, Oil 233
Aloes, Barbadoes and Socotra 219
Aloin 220
Alpha-Naphthol 494
Alphol 494
Alstonia 222
Alteratives 153
Alternative method of making
waters... 78
Alum 223
Aluminii Chloridum ... 223
Alumnol 223
Amaltas 317
Ambiguous nomenclature ... 114
Aminoform 317
Ammoniacum 225
Ammoniated Phenyl acetamide 170
Ammonio-Mercuric chloride... 431
Ammonii Benzoas 269
,, Bicarbonas ... 229
,, Bromidum ... 278
,, Carbonas ... 229
,, Chloridum ... 230
,, Embelas ... 380
,, Fluoridum ... 230
,, Iodidum ... 454
,, Phosphas ... 232
,, Picras... ... 230
,, Salicylas ... 195
,, Tartras ... 230
,, Valerianas ... 645
Ammonium Sesquicarbonate 229
Amygdophenin 526
Amygdala Amara 232
Ammonol 170
Amyl Colloid ... 354, 647
,, Nitris 233
Amyloform 641
Amylum 236
,, Iodatum 451
Anæsthetics, general 158, 160
,, local. 155
Analgesics.. 155
Anantamul 425
Anaphrodisiacs 164
,, direct ... 164
,, indirect ... 164
Anarcotine 512
Anár ka chhál 417
Andrographis 236
Anethi Fructus 237
Angustura bark 369
Anhydro gluco-chloral ... 321
Anhydrotics or antihydrotics... 149
Anilipyrin 527
Anisi Fructus 237
Anodyne Colloid... ... 354
,, Hoffman's ... 206
,, General 151, 159
,, Local ... 155
,, Vesicant ... 307
Antacids 125
Antacid lozenge 56
Antagonism 109
Antagonists 110
Anthelmintics 153
Anthemidis Flores... ... 238
Anticholagogues 133
Antiemetics 127
,, cerebral.. ... 127
,, gastric 127
Antigalactagogue 165
Anti-expectorants 137
Antifebrin 170
Antikamnia 170
Antimonii Oxidum 239
,, Salts ... 239-240
Antinervin 170
Antiparasitics 167
Antiperiodics 167
Antipyretics 153
Antipyrin... 527
,, Amygdalate ... 527
,, Caffino-Criticum ... 287
,, Salicylate ... 287
Antisepsin 171
Antiseptin 652
Antiseptic gauze 66
Antiseptics 166
,, gastric 125
,, intestinal.. ... 131
Antispasmodics, bronchial ... 136
Antisialagogues or antisialics 123
Antiseptol 447
Antizymotics 167

Anusol 276
Anytin 605
Aperients... 129
Aphrodisiacs 163
Apocodeinæ Hydrochlor. ... 518
Apolysin 526
Apomorphinæ Hydrochlor. ... 516
Aqua Distillata 244
  ,, Picis 543
Arabin 6
Arachis oil 245
Araroba 246
Arbutin 643
Argentamin 248
Argenti nitras 247
  ,, Citras 248
  ,, Iodidi 248
  ,, Lactas 248
  ,, Oxidum 248
Argentol 248
Argonin 248
Aristol 447
Aristolochia 251
Armoraciæ Radix 252
Arnica 253
Aromatic sugars 68
Arsenic 172
  ,, Cigarettes 173
  ,, Preparations of 172-174
  ,, White 172
Arsenious Anhydride ... 172
Asafetida 254
Asaprol 494
Aseptol 181
Aseptoline 461
Asteracantha 443
Astringents, gastric.. ... 125
  ,, intestinal ... 130
  ,, vascular ... 143
Atropina 261
  ,, Oleatum 261
  ,, Sulphas 261
Anuntmul 636
Aurantii cortex 255
  ,, ,, Indicus ... 256
Azadirachta Indica ... 256

B

Báblá chhál, Bábul ká chhál... 169
Bábuná Ful 238
Bákas 205
Balsams 5
Balsam of Peru 257
  ,, Tolu 258
  ,, Copaiba 358
Bári Sánf 402
Bases 5
Basis for ointment ... 57, 100
  ,, in a recepe 117
Basilicon Ointment... ... 570
Basham's Mixture 392
Bassorin 5
  ,, paste 633
Baths 61
  ,, Air 65
  ,, Cold, varieties of ... 64-5
  ,, Hot, varieties of ... 64-5
  ,, Medicated 64
  ,, Table of 62
  ,, Temperature of ... 65
  ,, Vapour 65
Bearberry Leaves 643
Beeswax, white 319
  ,, yellow 319
Belæ Fructus 259
Beláti kumrar bij 367
Belladonnæ Folia 259
  ,, Radix 260
Bengal Kino 284
Benger's Liq. Pepticus ... 524
Benzene 271
Benzoinum 268
Benzoil-pseudo-tropeine ... 347
Benzol 271
Benzo-naphthol 494
Benzosol 362
Berberis 271
Bertoni's Ether 234
Betol 494
Bherandá Tel 572
Bháng 305
Bichloride of Mercury ... 429
Bijasar 468
Bile, Purified ox 387
Biranga 379
Bismal 276
Bismuth Cream 274
Bismuth oxybenzoate ... 275
  ,, Preparations of 273-276
Bismuthol 275
Bitter Apple 354
Black Catechu 318
  ,, Draught ... 38, 590
  ,, Haw 648

Black Pepper 540
,, Sassafras 502
,, Snake root 333
,, Wash ... 36, 431
,, Willow 197
Bladder, action on 148
Blaud's Pill ... 42, 392
Bleaching Powder 324
Bliss's Cure 562
Blistering Collodion ... 306
,, Fly 306
,, Liquid ... 32, 307
Blisters 93
,, spreading of ... 93
Blood, action on 137-9
Blood vessels, action on ... 142-4
Blue pill 42, 428
,, Ointment ... 60, 428
,, Stone and vitriol ... 368
,, Wound stone 223
Body heat, action on ... 153-4
Ból, *Bole* 492
Bolus 66
Boni's Blister 307
Borax 178
Boric Acid 178
Boric Acid, Preparations of ... 178
Boro-glyceride 178
Botany Bay Kino 468
Bottles, dispensing 75
,, graduation 76
,, table on 74
Bougies 66
,, Preparation of ... 96-7
,, of special drugs ... 97
Branalcane 178
Brandy ... 46, 212
,, Mixture 213
Bromalin 279
Brom-ethyl-Formin ... 279
Bromides ... 278-279
Bromidia 279
Bromipin 279
Bromoform 279
Bromo Hemol 279
,, Phenol 181
Bromol 181
Bromum 278
Bronchi, action on 136
Bronchial glands, action on ... 136
Broom 587
Brucine 496
Bruising 9
Bucco 283
Buchu 283
Buginarium Iodoformi et Eucalypti 446
Burgundy Pitch 541
Burnett's Fluid 051
Buteæ Gummi 284
,, Semina 284
Butyl-Chloral Hydras ... 285

C

Cacao Butter 626
Cachets 66
Cacodylate 174
Caffeina 286
,, Preparations of 286-87
Calabar Bean 534
Calamina Præparata ... 652
Calcii Boras 296
,, Glycerophosphas ... 295
,, Hypophosphis ... 533
,, Lactas 194
,, Permanganas ... 563
,, Preparations of 290-96
,, Salicylas 195
Calcination 9
Calcinol 296
Calomel 430
,, Cream 431
,, Ointment 431
Caloricrescents 154
Calotropis 296
Calumbæ Radix 297
Calx 292
,, Chlorinata 324
,, Sulphurata 295
Cambogia 299
Cambogia Indica 299
Camphor 300
,, Balls 300
,, Monobromide ... 300
Camphorated oil 300
Camphoric acid 300
Camphorodyne 327
Camphyline 494
Cannabinæ Tannas... ... 304
Cannabinon 304
Cannabis Indica 303
Cantharidin 307
Cantharis 306
,, Hair oil 307

Cantharis Lotion 307
Canton's Phosphorus ... 295
Caoutchouc 310
Capillaries, action on 144-5
Capsicin 310
Capsici Fructus 310
Capsules 66
,, of Amyl nitrite ... 234
,, of Castor oil ... 573
,, of Cod-liver oil ... 486
,, of Sandal wood oil... 578
Caraway Fructus 313
Carbamide 638
Carbanilic Ether 639
Carbasa Antiseptica ... 66
Carbo Ligni 311
Carbolic Acid 180
,, Preparations of 180-81
Carbonis Bisulphidum ... 312
Cardamomi semina ... 312
Cardiac deppressants ... 141
,, stimulants... ... 141
,, tonics 140
Cardio-inhibitory centre, action on ... 141-42
Carlsbad Salt, Artificial ... 596
,, water 596
Carminatives 126
Carmine 351
Carniferrin 393
Carron Oil 293
Carvone 313
Carvol 313
Caryophyllum 314
Casca Bark 375
Cascara Sagrada 315
Cascarilla... 316
Cassiæ Pulpa 317
Castor oil... 572
Cataplasmata, Cataplasms ... 67
,, Varieties of ... 67
Catechu 318
,, Pallidum 318
Cathartic Acid 590
Cathartics 129
Catheter oil 180
Caustics 144
Caustic Mitigated 248
,, Potash ... 551
,, Toughened ... 248
Causticum Zinci Chloridi ... 650
Celerina 649
Cephaeline Hydrochloride ... 458
Cerates 67
Ceratum Calaminæ... ... 652
,, Cocainæ 346
Cera Alba... 319
,, Flava 319
Cerebellum, action on ... 161
Cerebral depressants ... 158
,, stimulants ... 158
Cerasin 6
Cerii Oxalas 319
Cerosin 521
Cerumen, action on ... 163
Cetaceum... 319
Cevadine 647
Chalk Mixture 290
,, Precipitated ... 290
,, Prepared 290
Chamomile 238
Channels for administration ... 103-5
Charas 304
Charcoal 311
Charta 18
Chátim 222
Chaulmoogra Oil 421
Charta Nitrata et Chlorata ... 562
Chebulic Myrobalans ... 490
Chelsea Pensioner 420
Chemical Food 391
Chian Turpentine 625
Cherry Laurel Leaves ... 470
Chillie Paste ... 58, 310
China bádámer tel... ... 245
Chinoidin... 336
Chinosol ... see addendum
Chinotropine 642
Chiretta 320
Chloral cum Camphoratum ... 321
,, Formamide ... 321
,, Hydras 321
Chloralamide 321
Chloral Urethane 640
Chloralose 321
Chloralum 223
Chloric Ether .. 45, 327
Chlorinated lime 324
Chlorobrom 321
Chlorodyne ... 54, 327
Chloroform tinctures ... 67
Chloroformum 326
,, Aconiti ... 202
,, Belladonnæ ... 260

Chloroformum Camphoratum 326
,, Hyoscyami ... 444
Chloro-Sodio-Magnesian Aperient 596
Chlorphenol 181
Chocolate... 626
Cholagogues 67
Cholera and Diarrhœa Mix.... 291
Chrisma 521
Chrismaline 521
Christison's Pill 355
Chromic Anhydride.. ... 184
Chrysarobin 246
Chrysophanic Acid... ... 246
Chun 293
Cicutine 356
Cigarettes 67
,, Arsenical ... 173
Ciliary muscle, action on ... 162
Cimicifugæ Rhizoma ... 333
Cimicifugin 334
Cinchona 334
,, Febrifuge ... 335
Cinchonæ Rubræ Cortex ... 334
Cinchonidinæ Sulphas ... 335
Cinchoninæ Sulphas ... 335
Cinchonine 335
,, Iodo Sulphate ... 447
Cineol 385
Cinnamon... 343
Cissampelos 344
Citral 471
Citrine Ointment 431
Citrophen 526
Clemen's Solution 174
Cloves 314
Cluton's Febrifuge Spirit ... 206
Clysters 68
Cocæ Folia 345
Cocaina 346
,, Preparations of 346-47
Coccus 350
Cochineal 350
Cocoa 626
Cod-liver Oil 485
,, ,, Capsules ... 486
Codeina 518
Codeine Iodate 518
,, Phosphate... ... 518
,, Pastils 518
Colchici Cormus 351
,, Semina 351
Colchicine 352
,, Salicylate ... 352
Colchi-Sal 352
Cold Cream ... 57, 575
Collargol 248
Collodion 18, 353
,, Ichthyol 305
,, Table of 18
Collodium 353
,, Belladonnæ ... 260
,, Cocainæ... ... 346
,, cum. Iodoformo ... 446
,, Salicylicum ... 196
,, Salol 197
,, Stypticum ... 354
,, Zinci Chloridi ... 650
Colloid, Amyl 354
,, Anodyne 354
Collunaria 67
Collutories 67
Collyria 67
Collyrium Adstringens Luteum 652
Colocynthidis Pulpa ... 354
Combination of Drugs ... 111
Common Salt 599
Compound Pill of Asafetida ... 402
,, ,, Calomel ... 431
Compress, cold 65
,, hot antiseptic ... 70
Cone 72
Condy's Fluid 563
Confections 19
,, table of ... 19
Confectio Guaiacii Co. ... 613
Conii Folia 355
,, Fructus 356
Conina 356
Coninæ Hydrobromidum ... 356
Conjunctiva, action on ... 161
Conserves 115
Constringents, intestinal ... 130
Contraction of words ... 115
,, of phrases 115-16
Contusion 9
Convolvulin 464
Copaiba 358
,, Resin 358
Cordol 197
Coriander Fruit 360
,, Oil of 360
Cornutine 381
,, Hydrochloride & Citrate 381

Corrigent in a recepe ... 116
Corks 75
Corrosive Sublimate ... 429
,, ,, Pastils and Discs 430
Coscinium... 361
Cosmoline... 521
Coster's Paste 451
Cotton 415
,, Root Bark 416
,, Wool 415
Couch Grass 211
Counter-irritants 144
Cramp Bark 649
Creams 67
Cream, Salicylic 196
,, of Tartar 553
,, Zinc 653
Cremor Lithargyri 544
,, Zinci 653
Creolin 542
Creosal 447
Cresoform... 362
Creosotal 362
Creosote 361
,, Carbonate ... 362
,, Phosphate ... 362
Cresalol 447
Cresol 361
Creta Præparata 290
Creat 236
Crimidáná, *Cringdáná* ... 350
Crocus 364
Croton Chloral Hydras ... 285
,, Oil 364
Crude Chrysarobine ... 246
Crystallisation 9
Cubebs 366
Cucurbitæ Semina Præparata 367
Cumulative action 108
Cupping, wet 145
Cupri Arsenis 173
,, Sulphas 368
Cuprum Aluminatum ... 368
Curd Soap 581
Cure, Himrod's 562
Cuspariæ Cortex 369
Cusso 370
Cutting 10

D

Dálchini 343
Dárhald 271
Dárharidrakum 361
Dárimgácher chhál 417
Darts of Zinc Chloride ... 650
Dastá 649
Daturæ Folia 370
,, Semina 371
Deadly Nightshade Leaves ... 259
Decoction 19, 78
,, pots 78
,, table of 19
Decoctum Acaciæ Corticis ... 169
,, Adhatodæ ... 205
,, Agropyri ... 211
,, Cinchonæ ... 335
,, Cissampeli ... 345
,, Eucalypti Gummi.. 384
,, Gossipii Radicis Corticis 416
,, Hygrophilæ ... 443
,, Ispaghulæ ... 460
,, Papaveris ... 520
,, Sappan 581
Decoloration 10
Deliquescents 4
Deliriants 158
Delivery, wrong 76
Dentifrices ... 68, 122
Deodorants 167
Depilatories ... 68, 151
Dermatol 276
Despumation 10
Desiccation 10
De Valengin's Solvent ... 173
Dextroform 642
Dháni lanká 310
Diabetin 411
Di-acetyl tannin 404
Diachylon Ointment ... 545
,, Plaster 545
Dialysed iron solution ... 393
Diaphoretics 148
Diaphoretic Sedatives ... 149
,, Stimulants ... 149
Dhaniá 360
Diarrhœa Mixture 291
Diethyline-diamine... ... 642
Digallic Acid 403
Digestion 10
Digitalein... 371
Digitalin 372
,, Amorphous ... 372
,, Crystallised ... 372

Digitalin German 372
,, Verum 372
Digitalis Folia 371
Digitoxin 372
Di-Iodoform 447
Di-iodo Salicylic Acid ... 448
,, ,, Para Phenol Sulphonic Acid ... 448
Dill Fruit... 237
,, water 237
Diluted Hydrogen Cyanide ... 191
Dionin 537
Diosma 283
Direct action 121
Directions to patient ... 118
Disinfectants 166
,, table of ... 166
Dispensing 1, 74
,, general directions of 75-6
,, room 74
Dispermine 642
Dithymol Iodide 447
Dithion 196
Distillation 10
,, dry 10
,, fractional ... 10
Diuretics 146
,, table of 146
,, varieties of ... 146
Diuretin 626
Donovan's Solution ... 173
Dosage 105
,, circumstances affecting 106-8
Dose, adult 106
,, calculation of ... 106
Doses, grouping of 108
,, maximum 105
,, minimum 105
Dropping 77
Drops, size of 77
Dover's Powder ... 44, 504
Drug-eruptions 150-1
Drugs, characters of ... 3
,, classification of ... 122
,, collection of... ... 2
,, combination of ... 111
,, composition of ... 4
,, impurities of ... 2
,, poisonous 74
,, source of 2
,, testing of 74
Dry cupping 144
Dudhidbish 201
Duodenal stimulants ... 128
Duodenum, action on ... 128
Duotal 362
Dwale Leaves 259

E

Ear, action on 163
Earth-nut oil 245
East Indian Senna 590
Easton's Pills 391
,, Syrup ... 49, 390
Eau-de Goudron 543
,, Luce 227
Eau Maiche 442
Ecbolics 165
Effervescents 20
Effervescent Antipyrin ... 527
,, Epsom Salts ... 479
,, Pulvis Salis Carolini Factitii ... 596
,, Sodium Salicylate 195
,, Sodio-Magnesii Sulphas ... 596
,, table of ... 20
Efflorescents 4
Egg Flip 38, 213
Eka Iodoform 447
Eláchi 312
Elæosacchara 68
Elaterinum 378
Elaterium 378
Electuaries 19
Elegant prescriptions ... 117
Elder Flowers 578
Elixir ad longum vitam ... 220
,, Glusidi 411
,, of vitriol 100
,, Paregoric 505
,, Phosphori 530
,, Rhei 571
,, Simple 225
Elutriation 10
Embelia 379
Embrocation 29
Emetics 126
,, Central 127
,, Gastric 127
,, Gastro-Central ... 127
Emetine Hydrochlor. ... 458
,, Hydrobrom. ... 451
Emetinæ Vinum 458

Emmenagogues 165
Emollients 150
Emplastra ... 20, 93
,, table of 21
Emplastrum Belladonnæ Viride 260
,, Calefaciens Mylabridis 490
,, Capsici ... 310
,, Cocainæ ... 347
,, Mylabridis ... 490
Emulsio Iodoformi... ... 446
,, Morrhuæ Olei ... 486
,, ,, et hypophos. 486
,, Petrolei cum Hypophosphitibus ... 521
Emulsion, Pancreatic ... 519
Emulsions 68
,, compounding of ... 79-80
,, of special drugs ... 81-4
Endermic medication ... 104
Enema Opii 505
,, Olei Ricini 572
Enemata, enemas 68
,, varieties of ... 68-9
,, purgative ... 130
Enepidermic 104
Epidermic medications ... 104
Epispastics 144
Eosote 362
Epsom Salts 499
Ergota 380
Ergot of Rye 380
Ergotin 25, 380
Ergotinina 381
Ergotinine 381
Errhines 134
Erythrol 276
,, Nitrate 634
Erythrophleum 375
Escharotics 144
Eserine Sulph. 534
Essence of Chiretta ... 320
Ether 206
,, Aceticus 210
,, Chloric 327
,, Methylatus 206
,, Nitrous 2a9
,, Ozonic 442
,, Sulphuric 206
Ethyl Bromide 279
,, chloral urethane ... 640
,, Nitrite, Solution of ... 210
Ethyl Oxide 206
,, Urethane 639
Eucainæ Hydrochloridum A, and B 347
Eucalypteol 385
Eucalypti Gummi 384
,, Oleum 384
Eucalyptol 385
Eucalyptus Dressings ... 385
Eucasol 605
Euchinine... 337
Eudoxin 276
Euonymi Cortex 386
Euonymin 387
Euphorin 639
Euphthalmine 261
Euquinine... 337
Europhen... 447
Evacuants 129
Excipient in a recepe ... 116
,, for pills 86
Exhilarants 158
Expectorants 137
... group of ... 137
Explossive combination ... 111
Extract, Pond's 424
Expression 10
Extracts 22
,, group of 22-5
,, preparation of ... 22-5
,, table of 22-5
Extractum Acalyphæ Liq. ... 170
,, Adhatodæ Liq. ... 205
,, Agropyri Liq. ... 211
,, Aloe Socotrinæ ... 220
,, Belæ Liq. ... 259
,, Belladonnæ Fol. Alcoholicum 260
,, Berberidis ... 272
,, Cascaræ Sagradæ Liq. et Ins. 316
,, Conii Liq. ... 356
,, Elaterii 378
,, Eucalypti Gummi Liq. 384
,, Gossipii Radicis Corticis Liq. 416
,, Grindeliæ Liq ... 418
,, Hæmatoxyli Liq. ... 423
,, Hydrastis ... 440
,, Kavæ Liq. ... 467
,, Kolæ Liq. ... 287

Extractum Krameriæ Fl. ... 469
,, Lupuli 476
,, Lupulini fluidum ... 477
,, Mezerii Ætherium 485
,, Pancreatis ... 519
,, Papaveris ... 521
,, Pareiræ Liq. ... 524
,, Picrorhizæ Liq. ... 537
,, Viburni Prunifolii Liq. 649
Eye, action on 161
Eye-discs 29

F

False Calumba 361
,, Pareira Brava ... 844
Fátkiri 223
Fats 6
Fel Bovinum Purificatum ... 387
Fellow's Syrup 394
Fennel Fruit 402
Ferratin 393
Ferri Albuminas 393
,, Bromidum 394
,, Fluoridum 394
,, Hypophosphis ... 394
,, Lactas 393
,, Salicylas 195
Ferri Succinas 393
Ferrier's Snuff 275
Ferripyrin, Ferropyrin ... 527
Ferrum, Preparations of ... 388
Ficus 400
Figs 400
Filicic Acid 401
Filix Mas 401
Filtration 11
Flores Anthemidis 238
Flowers of Sulphur ... 613
Fluid Magnesia 478
Fly, Spanish 306
Flying Blister 309
Fœniculi Fructus 402
Fomentation 69
,, kinds of ... 69-70
Formaldehyd 641
Formalin 642
,, gelatin 642
Formic Aldehyd 642
Formoform 642
Fossiline 521
Fowler's Solution ... 31, 173
Foxglove Leaves 371
Frankincense 627
French Oil of Turpentine ... 622
Friar's Balsam ... 54, 268
Fumigation 70
,, calomel ... 65
,, mercurial ... 70
Fusion 11

G

Gách haldi 362
,, *marich* 310
Galactagogues 165
Galbanum... 402
Galla 403
Gallanol 403
Gallic Acid 403
,, ,, Anilide... ... 403
Gamboge 299
Gánd 169
Gándak 613
Gandhabená tel 416
Gánjá 303
Gargarisma 70
,, Chlori 559
,, group of ... 70-1
,, Myrrhæ ... 493
"Garrod's" Lozenges ... 614
Gastric astringents 125
,, irritants 125
,, juice, action on ... 124
,, nerves, action on ... 126
,, sedatives ... 125-26
,, stimulants 125
,, tonics 125
,, vessels, action on ... 125
Gastro-intestinal irritants ... 130
Gaultheriæ Oleum 407
Gauze, Alembroth 430
,, Antiseptic 66-7
,, Boric 178
,, Carbolic 180
,, Eucalyptus 385
,, Iodoform 447
,, Salicylic 196
,, Thymol 628
Gelanthum ... 102, 633
Gelatin 407
,, coating 91
,, paste 102
Gelatinum Zinci 653
,, ,, Dura ... 653

Gelsemii Radix 408
Gelsemin 408
Gelsemine 408
,, Hydrochlor. ... 408
Generative system, action on 103
Gentianæ Radix 409
Gentiopicrin 410
Geosote 362
Gin 213
Ginger 656
Glass, Soluble or water glass 604
Glauber's Salt 595
Glonoin oil 634
Glucanth 86
Glucose, Syrup of 577
Glucosides 6
Glucosimide 577
Glucusimide 411
Glusidum 411
Glutino peptonate of Corrosive Sublimate 430
Glutol 642
Glycerinum 412
,, Acidi Salicylici ... 196
,, Belladonnæ ... 261
,, cum Aqua Rosæ... 412
,, Iodi 451
Glycerins 26
,, table of 26
Glycerin Jelly 412
Glycero-alcohol 412
Glycogenic depressants ... 133
,, stimulants ... 133
Glycerol 412
Glycero-phosphate of Calcium 295
Glycyrrhizæ Radix 414
Glymol 521
Goa Powder 246
Goláp phul 575
Golmarich 540
Golden Ointment 429
,, Seal 439
Gorit 290
Gossipia antiseptica ... 71
Gossypii Radicis Corticis ... 416
Gossypium 415
,, Kramariæ ... 469
Goulard water 544
Goulard's Extract ... 34, 544
,, Lotion ... 34, 544
Granati Cortex 417
Grain, division of 76
Granulation 11
Granules 71
Green Mountain Cure ... 562
Gregory's Powder ... 44, 571
Grey Oil 428
,, Powder 427
Griffith's Mixture ... 37, 389
Grindelia 418
Ground nut Oil 245
Guaiacetin 362
Guaiaci Lignum 419
,, Resina 419
Guaiacol 362
,, Benzoas 362
,, Carbonate... ... 362
,, Salol 362
,, Valerianas ... 362
Gulancha 631
Gums 6
,, Action on 122
Gum-resins 6
Gum Acacia 169
,, Benjamin 268
Gummi Indicum 420
Guttæ 71
,, Hyoscinæ 445
,, Pilocarpinæ 461
,, Physostigminæ c. Cocaina 535
,, Zinci Chloridi ... 650
,, ,, ,, cum Cocaina 650
Gynocardia Odorata ... 421

H

Habit 107
Habitat 2
Hæmatoxyli Lignum ... 422
Hæmatics 138
Hæmostatics 143
Hair, action on 151
,, Washes 151
Hamamelis 423
Hamamelin 423
Hamamelidin 423
Hamilton's Pills 355
Hard Paraffin 521
,, Soap 581
Hartshorn Liniment ... 227
Háshish 305
Haritaki 490
Haustus 71

Haustus Sulphonal 611
,, Terebini 621
,, Trinitrini 634
Hazeline 424
Heart, action on ... 140-43
Heavy Magnesia 477
Heberden's Ink 388
Hedonal 640
Helcosol 275
Hemidesmus 425
Hemlock 355
Hemp, Indian 303
Henbane Leaves 443
Hepatic depressants ... 133
,, stimulants 132
Heroin 507
Hetol 603
Hexanitrin 634
Himrod's Cure 562
Hing 254
Hippo 457
Hirekas 312
Hirudo 425
Hirudo Australis 426
Hoffman's Anodyne 46, 206
Holocaine Hydrochlor. ... 347
Homatropinæ Hydrobromidum 261
Homatropine 261
Hominy Bush Bark... ... 386
Honeys 36
Honey, Clarified 481
,, table of 36
Honthin 404
Hops 476
Horse Radish Root ... 252
Huile de Cade 286
Humulus 476
Hydrargyrum 427
,, Preparations of 427-432
Hydrastin 440
Hydrastina 440
Hydrastinine 440
Hydrastinæ Hydrochlor. ... 440
Hydrastininæ ,, ... 440
Hydrobromate of Homatropine 261
Hydrobromic Acid 181
Hydrochlorate of Quinine ... 336
Hydrochloric Acid 188
Hydrogen Acetate 171
,, Borate 177
,, Citrate 185
,, Lactate 193
Hydrogen Oleate 194
,, Peroxide Solution... 441
Hygrophylla 443
Hyoscinæ Hydrobromidum ... 445
Hyoscyaminæ Sulphas ... 445
,, Hydrobrom. ... 446
Hyoscyamus 443
Hypnal 321
Hypnotics 158
Hypophosphites 553

Iatroleptic medication ... 104
Ice-bag 63
Ichthalbin 605
Ichthargan 605
Ichthyol 604
,, Collodion 605
,, Paste 605
Imperial Drink 554
Inceneration 9
Ince's precautions 87
Incompatibility 109
,, Chemical ... 109
,, Physical 109
,, Physiological ... 110
Indian Birth Wort 251
,, Gamboge 299
,, Gum 420
,, Hemp 303
,, Oil of Verbena ... 416
,, Orange Peel ... 256
,, Podophyllum ... 256
,, Sarsaparilla 425
,, Squill 641
,, Valerian 646
India Rubber 310
Indrabaruni 354
Indrajab 460
Indirect action 121
Infusion 27, 78, 104
,, Concentrated ... 78
,, Table of 27-28
Infusum Alstoniæ 222
,, Andrographis ... 236
,, Azadirachtæ ... 256
,, Coscinii 361
,, Digitalis Conc. ... 372
,, Gentianæ Comp. Conc. 411
,, Jaborandi 461
,, Nucis Vomicæ ... 495
,, Tinosporæ... ... 631

Infusum Toddaliæ 632
Inhalations 72
,, group of ... 133
Injectiones, injections ... 71
,, Hypodermic ... 28
,, Parenchymatous .. 104
,, Rectal 68
,, Table of ... 28
Injectio Ergotininæ... ... 381
,, Hydrarg. Iodi. Rub. Hypodermica 428
,, ,, Iodidi (Pro vagina) 428
,, Hyoscinæ Hypodermica 445
,, Hyoscyaminæ ,, 446
,, Morphinæ et. Atropinæ Hypodermica 506
,, Physostigminæ Sulph. Hypodermica 535
Inoculation 104
Insufflatio Iodoformi ... 447
Insufflations 7
Intestin 275
Intra-ocular tension, action on 162
Iodantipyrine 451
Iodine 450
,, Preparations of ... 451
Iodipin 451
Iodized Phenol 451
,, Starch 451
Iodo Caffeine 451
,, Cresol 448
Iodoform 446
,, Dressings ... 447
,, Varnish 447
Iodoformal 447
Iodoformin 447
Iodoformum Bituminatum ... 448
,, Præcipitatum ... 446
Iodo-glycerin solution ... 451
Iodol 446
Iodopyrin... 451
Iodosalicylic Acid 451
Iodo-theobromin 627
Iodothyrin ... 451, 629
Iodum 450
Ipecacuanha 457
Iris, action on 162
Iron 388
Iron Tropon 393
Iso-Butyl Nitrite 234
,, Orthocresol Iodide 447
Ispaghula... 460
Isurmul 251
Itrol 248
Itrosyl 209
Izal ... see addendum.

J

Jaborandi Folia 461
Jáfrán 364
Jaipáler tel 364
Jaiphal, Jaintri 491
Jalapa 464
Jalapæ Resina 464
James' Powder ... 24, 240
Jángli Peáj 641
Jasmine, yellow 408
Jásthimadhu 414
Jellies 103
Jennings' Saline Solution ... 600
Jephson's Powder 614
Jirá 313
Jónk 425
Jowáner tel 211
Juices 46
Jujubes 71
Juniperi Oleum 465

K

Kábábchini 366
Kakmari Ointment 538
Kaladana 466
Kálmeg 236
Kamlá nebur khoshá ... 255
Kaolin 467
,, excipient 86
Kaposi's Ointment 494
Kárpur 300
Kartodali 632
Karua bádám 232
Kasturi 488
Kátbish 201
Káth 318
Kava-Kava 467
Kavæ Rhizoma 467
Káyaputi ká tel 289
Kefir 577
Keratin-coating 91
Khari 290
Khayer 318
Kidneys, action on 145
Kieselghur, excipient ... 86
Kino 468

Kino Eucalypti 468
Koji 619
Kokli 170
Koumiss 576
Kousso 370
Krameria 469
Kreat 236
Kryofin 526
Kuchilá 495
Kule-khárá 443
Kutki 537

L

Labanga 314
Labarraque's Disinfecting fluid 325
Lachrymal glands, action on .. 161
Lactic Acid 193
Lactophenin 526
Lactol 494
Lactose 576
Lævulose 411
Lálposto 572
Lamellæ 29
,, Picrotoxini ... 538
,, table of 29
Lanæ, Adeps 204
Lanoline 205
Lanolinum 71
,, Hydrargyri ... 428
Lapis Divinus ... 368, 223
,, Miraculosus 223
Lard 204
Largin 248
Lassar's Paste for Eczema ... 653
Laudanum ... 53, 505
Laurocerasi Folia 470
Lavandulæ Oleum 470
Lavements 68
Law of dissolution 158
Laxatives... 129
Lead 543
,, Sugar of 544
,, White 545
Leeches 425
Leeching 145
Lens, action on 162
Levigation.. 11
Lieter's coil 63
Light Magnesia 477
Lime 292
,, Water 293
,, Juice and Glycerin ... 233
Limonis Cortex 471
,, Succus 186
Lincture 71
Linctus ... ., 71
,, Morphinæ... ... 506
Linimenta, liniments ... 29
,, table of. ... 29-31
Linimentum Aconiti Co. ... 202
,, Calaminæ ... 652
,, Camphoræ Co. ... 300
,, Capsici ... 310
,, Exsiccans ... 633
,, Iodi 450
,, Opii Ammoniata 505
Linseed Meal 472
Linteum, lints 71
Linum 472
,, Contusum 472
Liquores, liquors 31
,, table of 31, 35
Liquor Aluminii Acetici ... 223
,, Ammonii Acetatis ... 229
,, Ammonii Citratis ... 229
,, Andrographidis Concentratus ... 237
,, Antisepticus ... 542
,, Aristolochiæ Conc. ... 252
,, Arsenici Bromatus ... 174
,, Aurii et Arsenii Bromidi 174
,, Berberidis Conc. ... 271
,, Bismuthi 274
,, ,, Conc ... 275
,, Bromo-chloral Co. ... 279
,, Carbonis Detergens ... 542
,, Chlori 325
,, Copaibæ Solubilis ... 358
,, Coscinii Conc. ... 301
,, Epispasticus Mylabridis 490
,, Ergotæ Ammoniata ... 381
,, Ferri Chloroxidi ... 392
,, ,, Dialysatus ... 393
,, ,, Hypophosph. Co. 394
,, ,, ,, Fort. 394
,, ,, Iodidi ... 393
,, ,, Peptonati ... 394
,, ,, Phosph. Fortis 391
,, ,, Subsulphatis ... 392
,, Hypophosphitum Co. 394
,, Iodi 451
,, Magnesii Bromidi ... 478
,, Morphinæ Bimeconatis 505
,, Pepticus 524

Liquor Picrotoxini Aceticus ... 538
,, Potassæ Arsenitis ... 173
,, Thymol 628
,, Tinosporæ Conc. ... 631
,, Toddaliæ Conc. ... 632
Liquorice 414
Litharge 545
Lithium 473
,, Bromide 279
,, Diuretin 627
,, Preparations of 473-74
Lithontriptics, Biliary ... 133
,, Urinary ... 147
Liver, action on 132
Lixivation 11
Lobán 268
Lobelia 475
Lobeline Sulph. 475
Local action 121
,, ,, immediate ... 121
,, ,, remote ... 121
Loch 71
Logwood 422
London Paste 594
Lopez Root 632
Loretin 448
Losophan... 448
Lotiones, lotions 36
,, table of 36
Lotio Bismuthi 275
,, Calaminæ 652
,, Calcii Sulphurati ... 296
,, Crinalis 227
,, Evaporans 231
,, Refrigerans 231
,, Rubra 652
,, Sulphatum 652
Lozenges 99, 100
Lugol's Solution 451
Lunar Caustic 247
Lupulus 476
Lycetol 642
Lysidine 642
Lysol ... see addendum.
Lytta 306

M

Maceration. 99
Mácher tel 485
Mádár 296
Magnesia Levis 477
,, preparations of 477-79
Majuphal 403
Mákálphal 354
Malto Viburnin 649
Malakine 526
Male Fern 401
Mammary glands, action on... 165
Mannitol Nitrate 634
Margosa Bark 256
Mashiná 472
Massæ, masses 72
Masticatories 72
Materia Medica Proper ... 2
Mate 286
Measures ... .12, 76
,, in prescription ... 113
,, English domestic ... 113
,, Indian domestic ... 114
Meconic Periodida 505
Melon Pumpkin Seeds ... 367
Mel Boracis 481
,, Depuratum 481
Mella, Melita 36
,, table of 36
Menthæ Piperitæ Oleum ... 482
Menthol 483
,, Spray 484
Mentholeate 484
Mercury 427
,, Plaster Mull ... 428
Metabolic depressants ... 152
,, stimulants ... 152
Metabolism, action on 151, 153
Meta tri-iodo-Cresol ... 448
Mithákáduká bij 369
Methyl di-iodo-Salicylate ... 448
,, Salicylas 407
Microcidine 494
Migranin 287
Milk, action on 165
,, Artificial, Human ... 576
,, Peptonised 519
,, Sugar 576
,, of Sulphur 613
Minim, division of... ... 77
Mistura Alba 478
,, Apomorphinæ et Terebini 621
,, Bismuthi Co. ... 275
,, Butyl-chloral ... 285
,, Ferri Aromatica ... 388
,, ,, et Ammonii Acet. 392
,, Moschi 489

Mistura Olei Ricini ... 573
,, Terebinthinæ Chiæ ... 625
Misri 577
Mitigated caustic 248
Mixture 37
,, compounding of ... 79-80
,, of special drugs ... 80-84
,, table of 37-38
Mollin 582
Mollinum... ... .72, 102
Mom 319
Monk's hood 201
Monobromacetanilide ... 171
Mono-phenetidin citrate ... 526
Monol 563
Monsel's Solution 392
Morphina 507
Morphinæ Acetas 505
,, Preparations of 505-507
Morrhuæ Oleum 485
Morrhuol 486
Morton's Fluid 451
Moschus 488
Motor paralysers 150
,, stimulants 150
Mouri 238
Mriganávi 488
Mucilagines, mucilages ... 38
Mucilago Gummi Indici ... 421
Mudar 296
Muárá Sang 545
Muktabarsi 170
Mungphali ke tel 245
Muriatic Acid 188
Muscles, action on... ... 154
Mushabár 219
Mydriatics.. 162
Mylabris 490
Myotics 162
Myrobalanum 490
Myristica 491
Myrrha 492

N

Naphthalene 494
Naphthalol 494
Naphthol, *a* 494
,, Aristol 448
,, *β*. 493
,, Benzoyl 494
,, c. Camphora ... 494
Narcotics... 158
Narcotics group on ... 159
Narcotine 512
Nasal astringents 134
,, sedatives 134
Nauheim bath 64
Nebullæ 72
Nebula Acidi Lactici ... 194
,, Iodoformi 447
Neem Bark 256
Needle-bath 63
Nervous system, action on 154-61
Nemburas, *Nembu ká arak* ... 186
Neutral principles 6
,, Quinine Sulphate ... 337
Nim-bath... 65
Nishadal 230
Nirvanin 347
Nitre 561
Nitric Acid 188
Nitrite of Amyl 233
Nitrated papers 562
Nitro-erythrite 634
Nitroglycerin 634
Nitro-mannite 634
Nobel's blasting oil... ... 634
Nomenclature, ambiguons ... 114
Non-official preparations ... 61
Nose, action on 134
Nosophen 448
Nut-galls 403
Nutmeg 491
Nutrose 577
Nux Vomica 495

O

Ocular muscles, action on ... 163
Oil-sugars... 68
Oil, Catheter 180
,, of Dill 237
,, essential 5
,, table of 39
,, fixed 6
,, table of 39
,, Grey 428
,, of Juniper Tar... ... 286
,, of Male Fern 401
,, of Spearmint 483
,, of Verbena, Indian ... 416
,, of Winter Green ... 407
Ointment, Basilicon 58, 570
,, Blue ... 60, 428
,, Calomel 60, 431

Ointment, Citrine ... 60, 431
,, Compounding of... 100
,, General table of... 57-9
,, Golden... 60, 429
,, Lead, table of .. 59
,, mercurial ... 60
,, of special drugs ... 101-2
,, Red Precipitate 60, 429
,, Scott's 428
,, White Precipitate 60, 431
Oleatum Aconitinæ ... 202
,, Atropinæ... ... 261
,, Veratrinæ... ... 647
Oleic Acid 194
Olea, oils 38
Oleo-resina Capsici... ... 310
,, Lupulini ... 477
,, Piperis... ... 540
Oleum Ajowan 211
,, Amygdalæ... ... 233
,, Anethi 237
,, Anisi 238
,, Anthemidis ... 239
,, Arachis 245
,, Cadinum 286
,, Cajuputi 289
,, Cardamomi... ... 313
,, Carui 313
,, Caryophylli ... 314
,, Cinnamomi... ... 344
,, Cinereum 428
,, Copaibæ 358
,, Coriandri 360
,, Crotonis 364
,, Cubebæ 366
,, cum Cocaina ... 347
,, Deelinæ 521
,, Eucalypti 384
,, Gaultheriæ... ... 407
,, Graminis Citrati ... 416
,, Gynocardiæ ... 421
,, Homatropinæ c. Cocaina 262
,, Juniperi 465
,, Lavandulæ... ... 470
,, Limonis 471
,, Lini 572
,, Menthæ Piperitæ ... 482
,, ,, Viridis ... 482
,, Morrhuæ 485
,, Myristicæ 491
,, ,, Expressum.. 492
,, Nitroglycerini ... 634
Oleum Olivæ 501
,, Phosphoratum ... 530
,, Pimentæ 539
,, Pini 539
,, Ptychotis 211
,, Ricini 572
,, Rosæ 575
,, Rosmarini 575
,, Santali 578
,, Sesami 592
,, Table of 39-40
,, Terebinthinæ ... 622
,, Theobromatis ... 626
Oliveri Cortex 502
Olfactory apparatus, action on 134
Opium 502
Opodeldoc ... 72, 582
Orange Wine 213
Ordeal Bean 534
Oro-nasal Inhalation ... 362
Orphol 275
Ortho-naphthol 494
Orthoform 347
,, Monobromphenol... 181
Otto of Rose ... 40, 575
Ouabaïn 609
Ourari 637
Oxydols 442
Oxidising substances ... 93
Oxytoxics... 165
Oxygen gas 442
,, water 442
Oxysparteina 587
Oxysparteinæ Hydrocholor. ... 587
Ozokerine... 521
Ozonic Ether 442
Ozone Papers 562

P

Paints 72
Palásh gand 284
Pán 272
Panama Bark 568
Pancreatis Liquor 519
Pancreatin 519
Pangaduine 416
Papaveris Capsulæ 520
Papers 18
,, folding of 92
,, waxed 93
Para-acet Phenetidin ... 526
,, Monochlor Phenol.. 161
Paraffinum Durum 521

Paraffinum Liquidum 521
,, Molle 521
Paraffin wax 521
Paraform 642
Paraldehyde 522
Parasiticides 167
Paregoric 54, 505
,, Elixir 505
,, Scotch 55
Pareira 523
Parrish's Chemical Food ... 390
,, Syrup 390
Paroleine 521
Pasta, Pastes ... 72, 102
,, Arsenicalis 174
,, Arsenii Escharoticus ... 174
,, Amyli Iodidi ... 451
,, Copaibæ 359
,, Ichthyol 605
,, Londinensis... ... 594
,, Zinci Chloridi ... 650
Paste, Coster's 451
,, Chilli 310
,, Copaiba 359
,, Lassar's 653
,, Vienna 552
,, Ward's 540
Pastillus, Pastils 72
,, Cocainæ Hydrochlor. 347
,, Codeinæ 518
,, Iodoformi ... 447
,, Sulphuris Co. ... 614
,, Thymol 628
Pea-Nut Oil 245
Pearl-coating 91
Pectin 6
Pediculi, action on ... 167
Pellitory Root 567
Pelletierinæ Sulphas ... 417
,, Tannas... ... 417
Pelosine 523
Pencils 72
Pepper, Black 540
Peppermint 482
,, Camphor ... 483
,, Lozenge ... 482
,, Syrup 482
Pepsin 524
,, Tablets 524
Pepsina Amylacea 524
,, Saccharatum ... 524
Peptone 525
Peptonised milk 519
Percolation 99
Perles 72
,, of Phosphorated oil ... 530
Permanganate of Potassium ... 563
,, of Sodium ... 604
Peronine... 507
Peru, Balsam 257
Pessaries, compounding of ... 96-7
Petroleum Jelly 521
Petrosulphol 605
Pharbitisin 466
Pharbitis Nil 466
Pharmaceutical processes ... 9
Pharmacy 1, 74
,, extemporaneus ... 1
,, official 1
Pharmacodynamics... ... 1
Pharmacognosy 1
Pharmacology 1,120
,, general 120
Pharmacopœia, British ... 1, 9
Pharmacopœial preparations... 15-61
Phenacetinum 526
Phenazonum 527
Phenic Acid 180
Phenocoll Hydrochloridum ... 526
,, Salicylas ... 526
Phenol 180
,, Bismuth 275
,, Camphor 181
,, Iodized 181
Phenyl Acetamide 170
,, Alcohol 180
,, Dimethyl Pyrozolone... 527
,, Hydrate 180
,, Urethane 639
Phesin 526
Phosote 362
Phosphate, saccharated wheat 355
Phosphorus 530
Phosphotal 362
Physostigmatis Semina ... 534
Physostigmine 534
Physostigminæ Hydrodromidum 535
,, Salicylas ... 535
,, Sulphas ... 534
Pick-me-up 230
Picrorhiza... 537
Picrotoxin... 538
Pigmenta, Pigments ... 72
Pigmentum Acidi Borici ... 178

Pigmentum Antisepticum ... 181
,, Argenti Nitras Æthereum 248
,, Chrysarobini ... 246
,, Mandl 451
,, Menthol ... 484
,, Picis cum Iodo ... 450
,, ,, Liq. ... 543
Pill, Blaud's 392
,, Blue 428
,, Christison's 355
,, coating 90
,, compounding of ... 84-85
,, Easton's 391
,, Excipients 86-87
,, Guy's 377
,, Hamilton's 355
,, Niemeyer's 378
,, of special drugs ... 87
,, Plummer's 431
,, Silvering 90
Pilocarpinæ Nitras... ... 461
,, Phenas ... 461
,, Salicylas ... 461
Pilocarpine 461
,, Carbolate ... 461
,, Hair lotion ... 461
Pilula, Pills 45
,, Acidi Carbolici ... 180
,, Aloini Co. 220
,, Andrographidis Co. ... 237
,, Asiatica 174
,, Butyl-Chloral ... 285
,, Codeinæ Co.... ... 518
,, Conii Co. 356
,, Ferri Carbonatis ... 389
,, ,, Iodidi 393
,, ,, Quininæ et Strychninæ Phosph. ... 391
,, Hyd. et Digitalis Comp. 372
,, Nitroglycerini ... 634
,, Pancreatica 519
,, Picis Liquidæ ... 543
,, Strophanthi 609
,, Terebinthinæ Chiæ ... 626
,, et Zinci 626
,, Trium Valerianatum ... 645
,, Zinci cum Belladonna 653
,, ,, Valerianatis 645
Pimenthol 484
Pimenta 539
Pini Oleum 539
Pinol 539
Piperazine 642
,, Quinate... ... 642
Piperidine Guaiacolate ... 541
,, Tartrate... ... 541
Piperinum 540
Piperonal... 541
Pix Burgundica 541
,, Carbonis Præparata ... 542
,, Liquida 542
Plasma, action on 138
Plasters ... .20, 94
,, Mammary.. ... 96
,, spreading of ...94-96
Plumbum 543
,, Preparations of 543-545
Plummer's Pill 42
Podophylli Indici Resina ... 551
,, ,, Rhizoma ... 551
,, Rhizoma ... 548
,, Resina 548
Podophyllin 549
Podophillotoxin 542
Poison Nut 495
Poisonous drugs 74
Po-ho-yo 484
Points of Zinc Sulphate ... 652
,, ,, ,, and Alum... 652
Pomegranate 417
Pond's Extract 424
Poppy Capsules 520
,, Red 572
Posology 105
,, Circumstances affecting ... 106-108
Posto Dhenri 520
Potassa cum Calce 552
,, Sulphurata... ... 616
Potassii Benzoas 269
Potassio Tartrate of Antimony 240
Potassium 551
,, Guaiacol Sulphate 362
,, Oxychinolin Sulphate 338
,, Preparations of 551-565
Potus Imperialis 554
Poudre Nutritive 524
Poultices 67
,, Ice 67
,, Tokmalanga ... 67
Powders ... .43, 92
,, compounding of ...92-93

Powders, table of 43-44
Precipitated Chalk 290
,, Sulphur ... 613
Prepared Calamine ... 652
Prescribing, art of 113
Prescriptions, directions in .. 75
,, dispensing of ... 75
,, elegant ... 117
,, for children ... 76
,, label of ... 75
,, position of ... 75
,, reading of ..75, 76
,, repitition of ... 76
,, writing of ... 117
Primary action 122
Proctor's Paste 26
Proof Spirit 212
Propionyl Phenetidin ... 526
Protargol 248
Prunum 566
Pruni Virginianæ Cortex ... 506
Prussic Acid 191
Pterocarpi Lignum 567
Ptychotis Oil 211
Pulveres 43
Pulverisation 11
Pupil, action on 161
,, contractors 162
,, dilators 162
Pulvis Acetanilidi Compositus 170
,, Aromaticus 344
,, Bismuthi Co... ... 275
,, Butæ Seminum ... 284
,, Ipecac sine Emetina ... 457
,, Kaladanæ Co. ... 466
,, Lobeliæ Co. 562
,, Salis Carolini Factitii Effervescens 596
,, Zinci et Amyli ...
,, Zinci et Hydrarg. Subchlor. 653
Pudinar tel 483
Pumiline 539
Purgatives 129
,, cholagogue ... 129
,, drastic 129
,, saline 129
,, simple 122
Pustulants 144
Pyramidon 527
Pyrethrum 567
Pyroxylinum 415
Pyrozone 442

Q

Quassia 568
Quassin 568
Quillaia Bark 568
Quinaphthol 494
Quinetum 337
Quinine 335
,, Preparations of 336—37
Quinidine 338
Quinolin 338
Quinosol 338

R

Raktá chandan 567
Rasot 272
Rectified spirit 212
Red Chromate of Potassium.. 551
,, Corpuscles, action on .. 139
,, Gum 384
,, Gourd Seeds 367
,, Poppy petals 572
,, Precipitate Ointment ... 429
,, Sander's wood ... 567
Reflex movements, action on.. 157
Refrigerants 124
Remote action 121
Repercolation 99
Resins 7
Resina 569
,, Jalapæ 464
,, Kaladanæ 466
,, Podophylli 549
,, ,, Indici ... 551
,, Scammoniæ. ... 584
Resinol 570
Respiration, action on ... 133
Respiratory centre. action on.. 135
Retinol 570
Revulsives 145
Rhamni Purshiani Cortex ... 315
Rhatany Lozenge 469
,, Root 469
Rhei Radix 570
Rhodallin... 593
Rhœados Petala 572
Ricini Oleum 572
Rochelle Salt 595
Rosæ Gallicæ Petala ... 575
Rosin 569
Rosmarini Oleum 575
Rubefacients 144
Rubidii Iodidum 454

Rubidium Bromide... ... 279
,, Ammonium Bromide 279
Rubini's Essence 300

S

Sabadilla 646
Saccharated Wheat Phosphates 533
Saccharin 411
Saccharum Lactis 576
,, Purificatus ... 577
,, Solubile ... 411
Sacred Bark 315
Safedá 545
Safrol 583
Saffron 364
Sal Alembroth 430
,, Ammoniac 230
,, Volatile, Spirit of ... 229
Salbromalid 170
Sal Carolinum Factitium ... 596
Salacetol 196
Salicinum... 196
Salicylamide 196
Salicylanilide 171
Salicylate of Aluminium ... 196
,, of Bismuth ... 274
,, of Phenocoll .. 526
,, of Potassium ... 195
,, of Sodium ... 195
Salicylic Acid 195
,, Alcohol 197
,, Cream 196
Saline Solution, Normal .. 600
,, ,, Jenning's ... 600
Saliformin 196
Saligenin 197
Salipyrin 527
Salivary glands, action on ... 124
Salix Nigra 197
Sal Mirabile 595
Salocoll 526
Salol 197
,, c. Camphora... ... 197
,, Collodium 197
,, Tribromide 197
,, varnishing 92
Salophen 196
Salts 6
Salt, Common 599
,, Epsom 479
,, Glauber's 595
,, of Tartar 556
Salt, Rochelle 595
,, Seignette's 595
Saltpetre 561
Salumin 196
Salve-mulls 72
Salvo Petrolia 521
Sal volatile, spirit of ... 229
Salyl Acetol 196
Sandal wood oil 578
Sanitas Fluid 442
Sankhia, sanko 172
Sanoform... 448
Sanose 577
Santonin 579
Santoninoxim 579
Sapo Animalis 581
,, Durus 581
,, Jalapinus 465
,, Mollis 582
Saponin 588
Saponimenta 72
Sappan 581
Sapta parna 222
Sarsæ Radix 583
Sassafras 583
,, Black 502
Scabies, action on 122
Scaling 11
Scammoniæ Radix... ... 584
,, Resina ... 584
Scammonium 584
Scilla 585
Sclerotinic Acid 381
Scoparii Cacumina... ... 587
Scopolamine 444
,, Hydrobromide ... 445
Scott's Dressings 428
,, Ointment 428
Scotch Paregoric ... 55, 505
Secale Cornutum 380
Secondary action 122
Sedatives, Gastric 125
,, Nasal 134
,, Respiratory ... 135
,, Urinary... ... 148
Seidlitz Powder ... 44, 595
Seignette's Salt 595
Senegæ Radix 588
Senna 589
,, Indica 590
Sensory nerves, action on ... 156
Serpentaria. 591

Sesami Oleum 592
Sevum Præparatum 592
,, Phosphoratum ... 592
Sherry 213
Shetsár 236
Shorá 561
Sialagogues 123
Sidonal 642
Silicate of Sodium Solution ... 604
Silver Nitrate 247
,, Oxide 248
Simple Elixir 255
Sinapis 592
Sisá 543
Skin, action on ... 148-51
Slaked Lime 293
Small Chillies 310
Smelling Salts 230
Snake-root 591
,, Black 333
Snuff, Ferrier's 275
Soap Bark 569
Soda 599
,, Tartarata 595
Sodæ Tartaratæ Effervescens,
Pulvis 595
Sodii Hippuras 269
,, Hyposulphis 201
,. Santonas 580
Sodium 594
,, Biborate 178
,. Caffeine Iodide ... 451
,, Caseinate 577
,, Phenol Sulphonate ... 181
,, Preparations of 594-607
Soluble Glass 604
,, Gluside 411
Solution 12
Solutio Boracis 178
,, Ichthyol 605
,, Saturans 178
Somatose, Ferro 393
Sondáler áta 317
Sonf 238
Soporifics... 158
Soyá 237
Sozal 223
Sozoiodol 448
Sozolic Acid 181
Spanish Fly 306
Sparteinæ Sulphas... ... 587
Spearmint, Oil of 483
Spermaceti 319
Spinal depressants 157
,, stimulants 157
Spindle Tree 386
Spirits 45
Spirit of Salts 188
,, of Mindererus ... 229
,, of Sal volatile. 46, 229
,, table of 45
Spiritus Ætheris 206
,, ,, Co. ... 206
,, ,, Muriaticus ... 206
,, ,, Nitrosi ... 206
,, Camphoræ Fortior ... 300
,, Methylatus ... 212
,, Rectificatus ... 212
,, Salis Dulcis ... 206
,, Tenuior 212
,, Thymol 628
,, Vini Gallici ... 212
Spogel seeds 460
Squill 585
Squirting cucumber ... 378
Standardization 12
St. Ignatius' Beans ... 495
Staphisagriæ Semina ... 607
Starch 236
Stavesacre seeds 607
Stearoptenes 7
Steatina, Steatins 72
Steel drops 392
Sternutatories 134
Sticks 72
Stimulants, Cardiac.. ... 141
,, Cerebral ... 158
,, Duodenal ... 128
,, Gastric ... 125
,, Glycogenic ... 133
,, Hepatic ... 132
,, Metabolic ... 153
,, Spinal... ... 157
,. Vascular ... 143
Stomach, action on ... 124
Stomachics ... 124-25
,, group of ... 124
Stramonium 607
Strontii Bromidum ... 279
,, Iodidum 454
,, Salicylas 195
Strophanthi Semina ... 609
Strophanthin 602
Strychnia, Strychnine ... 496

Stupe, Turpentine 69
Styles 72
Styptics 143
Styptic Colloid 354
Styrax Præparatus 611
Suar ke charbi 204
Subchloride of Mercury ... 430
Sublimate 429
,, Discs or Pastils ... 430
,, Wood-Wool ... 430
Sublimation 12
Succi 46-7
,, table of 47
Succus Acalyphæ 170
,, Adhatodæ 205
,, Digitalis 372
,, Limonis 186
Sucrose 577
Sudorifics 148
Suet, Prepared 592
Sufed rái 593
Sugar coating 91
,, Inverted 411
,, of Lead 544
,, Refined 577
Sulphaminol 448
Sulphocarbol 181
Sulphocarbolic Acid ... 181
Sulphocarbolates 181
Sulpho Ichthyolate of Sodium 604
Sulphonal 611
Sulphur Præcipitatum ... 613
,, Sublimatum ... 613
Sulphurous Acid 200
Sumbul Radix 618
Suppositoria Chloral ... 321
,, Hydrargyri ... 428
,, Ichthyol ... 605
,, Krameriæ ... 469
,, Santonini .. 579
Suppositories 47, 96
,, compounding of ... 96-97
,, table of. ... 47
,, of predigested food 69
,, of special drugs ... 97
Sweat glands, action on ... 148
Sweet Almonds 232
,, Spt. of Nitre... 46, 209
Sydenham's Laudanum ... 505
Symphorol, N. S. & L. ... 287
Syrian Tragacanth... ... 633
Syrupi, Sprups 48, 97
Syrup, Easton's 390
,, grouping of by color ... 49
,, of special drugs ... 98
,, preparation of ... 98
,, Parrish's 391
Syrupus Acidi Hydriodici ... 451
,, Adhatodæ 205
,, Apomorphinæ Hydrochloridi 516
,, Butyl Chloral ... 285
,, Calcii Hypophosphitis 533
,, ,, et Ferri Lactophosphatis ... 164
,, Eucalypti Gummi ... 384
,, Ferri Bromidi ... 394
,, ,, ,, c. Quinina 394
,, Ferri Bromidi et Strychniæ ... 394
,, Ferri et Magnesii Phosph. ... 391
,, ,, Hypophosphitis 394
,, ,, Phosph Co. ... 391
,, Hypophosphitum Co 324
,, Ipecacuanhæ ... 457
,, ,, Aceticus 457
,, Krameriæ 469
,, Papaveris 521
,, Picis Liquidæ ... 543

T

Tabellæ 50
,, Erythrol Nitratis ... 634
,, Hypodermic ... 51
,, Mannitol Nitratis ... 634
,, Nitroglycerini Co. ... 634
,, Saccharini . . 411
,, Strophanthi ... 609
,, Sulphonal 611
,, Trinitrini 634
Taka Diastase 619
Tamarindus 619
Tannalbin 404
Tannic Acid 403
Tannigen 404
Tannin 403
Tannoform 404
Tannol, Tannopine ... 642
Tannone 404
Tannosal 362
Tar 542
,, Capsules 543
,, Coal, Prepared .. 542

Tar, Stockholm 542
,, Water 543
Taraxacum Root 620
Tartar Emetic 240
, Cream of 553
Tartarated Antimony ... 240
,, Iron 388
,, Soda 595
Tartaric Acid 186
Teeth, action on 122
Terebenum 620
Terebinthina Canadensis ... 622
Terebinthina Chia 625
Terebinthinæ Oleum ... 622
Terpinum Hydratum ... 623
Terpine 623
Terpinol 623
Testing of drugs 8
Tetra-iodo-Pyrrol 448
,, Iodophen olphthalein ... 448
Tetronal 612
Thebaine 512
Theine 286
Theobromatis Oleum ... 626
Therapeutics 1
,, Accessory ... 2
,, Emperical ... 1
,, Rational ... 2
Theriacanth 86
Thiocol 362
Thiol 605
,, Liquidum 605
,, Siccum 605
Thio-Resorcin 448
Thiuret 448
Thiosinamin 493
Thus Americanum ... 627
Thymol 627
,, Acetate of Mercury ... 432
,, Carbonate 628
,, Gauze 628
,, Solution (Volckman's) 628
,, Vapor 628
Thymotal 628
Thyrocoll 629
Thyroglandin 629
Thyroideum Siccum ... 629
Thyro-iodin 629
Tincturæ, Tinctures.. ...51. 98
,, Preparation of ... 98-9
,, tabie of 52-5
Tinctura Adhatodæ ... 205
Tinctura Aloes Co. ... 220
,, Alstoniæ 222
,, Ammoniæ Co. ... 227
,, Andrographidis ... 237
,, Antiperiodica ... 338
,, Aristolochiæ ... 252
,, Azadirachta Indica ... 257
,, Benzoini Simplex ... 268
,, Berberidis 272
,, Calotropis ... 297
,, Capsici Fortior ... 310
,, Carminativa ... 313
,, Chloroformi Co. ... 327
,, Coscinii 361
,, Eucalypti 385
,, Euonymi 387
,, Guaiaci 419
,, Hyoscyami Radicis ... 444
,, Iodi Decolorata ... 451
,, Ipecacuanhæ ... 457
,, Kaladanæ ... 466
,, Lobeliæ 475
,, Lupulinæ 477
,, Menthol Etherea ... 484
,, Moschi 489
,, Myrrh et Boracis ... 493
,, Oliveri Corticis ... 502
,, Opii Crocata ... 505
,, Phosphori Co. ... 530
,, Physostigmatis ... 534
,, Picrorhizæ ... 538
,, Podophylli Ammoniata 549
,, ,, Indici ... 551
,, Tinosporæ... ... 631
,, Warburg's. 338
Tinea, action on 122
Tinnivelly Senna 590
Tinospora 631
Toddalia 632
Toleration.. 107
Tolu, Balsam 258
Tolyl-antipyrin 527
Tolypyrin... 526
Tolysal 527
Tonics 152
,, Cardiac 140
,, Varieties of 152
Tongue, action on 122
Toughened Caustic ... 248
Toxicology 1
Tragacantha 633
Transfusion 104

Traumatol 448
Tribromophenol 181
Trichlor butylidene Glycol ... 225
,, ethylidene Glycol ... 321
,, Methane 326
,, phenol 181
Tri-iodo methane 446
Trinitrin 634
Trinitrocellulose 634
Trional 611
Triticum 211
Triturationes, triturations ... 73
Trochisci, Troches 55, 99
,, Ammonii Chloridi... 231
,, Boracis 178
,, Ferri Carbonatis Sacch 389
,, Opii 505
,, table of 56-57
Tropacocaine 347
Turner's Cerate 652
Turpentine oil 622
,, French oil of ... 622
Turpethum 636
Tussol 527
Tutiá 368
Tylophoræ Folia 636

U

Unguenta... ... .57, 100
,, Extensa 72
,, table of 72
Unguentum Acidi Chrysophanici 246
,, Atropinæ c. Cocaina 261
,, Benzoini ... 269
,, Bismuthi ... 275
,, ,, Oxidi ... 274
,, Calaminæ ... 652
,, Cupræ Oleatis ... 368
,, Diachylon Hebræ 545
,, Gynocardiæ ... 421
,, Iodoformi c. Atropina... ... 447
,, Iodoparaffini ... 447
,, Kaolini ... 467
,, Metallorum ... 432
,, Mylabridis .. 490
,, Myrobalani ... 491
,, ,, c. Opio 491
,, Naphthol ... 494
,, Oleo-resinæ Capsici 310
,, Picis Molle ... 543
Unguentum Pilocarpinæ ... 462
,, Potassæ Sulphuratæ 616
,, Salol c. Cocaina 197
,, Sulphuratum ... 613
,, Sulphuris c. Hydrargyro ... 613
,, Sulphuris Hypochloritis ... 613
,, Thymol ... 628
,, Zinci c. Acido Salicylico ... 653
Uralium 640
Urari 637
Urea 638
,, action on 133
,, Quinine 337
Urethane 639
Urethra, action on 148
Urginea 641
Uricedin 474
Urinary Apparatus, action on 145-48
Urine, action on 149
Uropherin 627
Urotropine 641
,, Quinate... ... 642
Ursal 639
Uterine depresants... ... 165
Uterus, action on 165
Uvæ Ursi Folia 643

V

Valerianæ Rhizoma ... 644
,, Indicæ Rhizoma ... 646
Vallet's Mass 389
Valsol 521
Vapores, Vapours 72
Vapor Ammonii Chloridi ... 231
,, Benzoini 269
,, Creosoti 362
,, Iodi 451
,, Olei Pini 540
,, Thymol 628
Varnishing Pills 90
Vascular Stimulants 142-43
,, Sedatives 148
Vaseline 521
Vaselinum 73
Vaso-constrictors 144
Vaso-Dilators 143
Vasomotor Centre, action on... 143
Vasogen 521
Vegetable Calomel. 549

Vehicle in a recepe... ... 116
Venesection 145
Veratrina 646
Veratrinæ Oleatum... ... 647
Vermicides 131
Vermifuges 131
Vesicants 144
Vesicant, Anodyne... ... 307
Viburnum 648
Vienna Paste 552
Vina 61
Vinegars 15
Vinum Emetinæ 458
,, Opii 505
,, Pepsinæ 525
,, Xericum 213
,, ,, Detannatum... 213
Virgin Scammony 584
Virginian Prune Bark ... 566
Virginia Snake Root ... 591
Vitriol, Blue 368
,, Elixir of 190
,, White 651
Vleminckx' Solution ... 617
Volckman's Thymol Solution 628
Voice Tablets 559

W

Wafer-paper 13
Wahoo 386
Warburg's Tincture ... 388
Ward's Paste 19
Warming plaster ... 21, 306
Wash, Black 431
,, Yellow 430
Washing Soda 599
Water 16, 77
,, Distilled 244
Water, Glass 604
,, Preparation of ...77-78
Waxes 7
Weighing 76
Weights 2
,, Indian Domestic ... 15
,, in Prescriptions ... 113
Wet-cupping 145
Wet sheet-pack 63
Wheat phosphates, Saccharated 533
Whiskey 213
White Arsenic 172
,, Lead 545
,, Mustard Seeds ... 593
,, Precipitate 431
,, ,, Ointment ... 431
,, Powder 431
,, Wax 319
Whitehead's Varnish ... 447
White Corpuscles, action on... 139
Wild Cherry Bark 566
Wintergreen, oil of ... 407
Witch-hazel 423
Wood Charcoal 311
,, Naphtha 212
,, Wool, Sublimate ... 430
Wourali 637
Wourara 637

Y

Yellow Bees wax 319
,, Wash ... .36, 430

Z

Zinc 649
,, Hydroxycarbonate ... 652
,, Preparations of... 650-655
Zingiber 656